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ABSTRACT

The purpose of the project was to develop and evaluate a training program in self regulatory skills with approximately 40 trainable mentally retarded students (TMR) (mean age 18 years) and to determine the effect of the acquired self regulatory skills on task performance and self concept. In Phase 1, six preliminary studies attempted to determine (1) whether TMR students could perform these requisite skills, (2) if these skills could be developed in students who did not have them, and (3) the effects of these acquired skills on task performance. Results indicated that few TMR students had appropriate self regulatory skills, but that these skills could be acquired, generalized, and retained as a result of a brief training period. The second phase involved evaluation of a training program with features appropriate to other structured (e.g., classroom) situations. Two groups were trained in the component self regulatory skills of self monitoring, self evaluation, and self reward, with one group having appropriate external standards of performance set and the other allowed to set its own standards of performance. Two additional groups served as controls. Results indicated (1) that trained students reached criterion and independently transferred self regulatory skills to new tasks; (2) that trained students, especially those who set their own appropriate standards, outperformed other groups; and (3) that there were no differences in self concept between the trained and control groups. (PHR)

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FINAL REPORT

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SELF-CONCEPT AND SELF-REGULATORY PROCESSES IN TMRs

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May, 1978

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Contents

Page

Introduction. 1

Part I: Preliminary Studies

Assessment and Training of Self-Monitoring Skills. 4

Acquisition of Standards for Performance 11

Acquisition of Self-Evaluation and Self-Reward Skills and Their Effects on Performance 17

Effects of Self-Evaluative Statements. 27

Ability to Delay Gratification and Causal Attributions 33

Reactivity and Accuracy of Self-Monitoring as a Function of the Valence of What is Monitored 37

Part II: Developing Self-Regulation and Evaluating Its Effects

Development and Application of a Training Package for Self-Regulation. 46

Evaluation of the Self-Regulation Training Package 54

Acquisition of Self-Regulation Skills 55
Effects of Self-Regulation Training on Task Performance . . 58
Effects of Self-Regulation Training on Self-Concept 66

Follow-Up Study: Effects of Self-Regulation Training on Task Performance 71

Summary 78

References. 84

Introduction

The goal of any special education facility such as Fairhaven TMR Training Center in San Diego, California is to provide students with an experience that will allow them to function as independently as possible. In focusing on the obvious need to develop self-help, cognitive-academic, and social behaviors we at times neglect other important concerns, in particular, how the retarded child feels about or views himself. These feelings may be equally or even more important than training in specific behavioral skills when trying to prepare the child for future life experiences.

Many investigators have pointed out that retarded persons have a low self-esteem due to frequent past failure experiences (e.g., see Altman & Talkington, 1971; Ross & Ross, 1972). In addition it has been argued that the retarded individual develops an outer-directed problem solving or coping strategy which results in external causal attributions (Baran, 1973; Talkington, Hall, & Altman, 1973). That is, they view their fate as being controlled primarily by others rather than themselves.

Self-concept (or esteem) is directly related to independence or self-control. As Ross and Ross (1972) note, the ability of retarded students to administer their own rewards has been very much underestimated. Thus, we (professionals and parents) typically control their consequences, many times setting minimal and inconsistent standards for external administration of rewards which in turn further inhibits positive self-concepts, self-regulation, and internal causal attributions. Thus, the retarded child is accurate and realistic in taking an outer-directed or external locus of control orientation.

The results of a lower self-esteem and an external locus of control orientation are far reaching. As Phares (1973) points out, reinforcement contingencies are not as effective in changing behavior when the connection between the consequences and behavior is not made. Instead, the consequence is attributed to external causes, and consequently the experience does not aid the externally oriented retarded person. This failure to learn from one's experience has been related to extreme risk taking, atypical shifts in level of aspiration after success or failure, and a failure to experience such feelings as pride or shame after success or failure (Phares, 1973; Weiner, 1972).

Self-reward responses have been directly related to these feelings of self-esteem (Reschley & Mittman, 1973). That is, individuals who have positive feelings about themselves (i.e., high self-esteem) are more likely to self-administer rewards. Since retarded persons typically administer rewards to themselves noncontingently (Ross & Ross, 1972), The development of appropriate self-regulatory skills should lead to greater independence and possibly increased feelings of self-esteem.

In addition, changes accomplished through self-regulation are more likely to be maintained over time as well as transferred to other similar situations and tasks.

The stated goals of this project was to develop self-regulatory skills in trainable mentally retarded (TMR) students. We also hoped to determine if

these acquired self-regulatory skills had any effect on students' task performance and/or general feelings of worth (i.e., self-concept).

When we began our project, September 1975, there were virtually no reports in the literature of any attempts to develop self-regulation skills in retarded populations. Since then there have been some preliminary reports.

For example, Nelson, Lipinski, and Black (1976) trained mildly retarded institutionalized adults to monitor their own face touching, talking, and object touching over a brief period of time in an attempt to evaluate the reactive effects of such self-monitoring. Their results suggest that the valence of the behavior (i.e., positive or negative value) did determine whether self-monitoring led to increases or decreases in the specific response. Kurtz and Neisworth (1976) report that they were able to teach severely retarded children to monitor their performance by adding a popbead to their chain each time they finished a simple problem. Mahoney and Mahoney (1976) presented a number of case reports where self-regulation strategies were utilized with borderline retarded children. For example, they taught a few children to count the number of math problems they finished each night and found some increases in performance, though they were not always stable. Two children were taught to give themselves a reward every time they brushed their teeth. This self-reward resulted in a dramatic increase in the frequency of tooth-brushing. Some indication that self-reward can maintain the paper collating in mildly retarded adults comes from Helland, Paluck, and Klein (1976).

We ourselves (see Litrownik, Franzini, Geller, & Geller, 1977) found that moderately retarded adolescents were more likely to decide to delay reward attainment if they had prior experience with the delay interval. Finally, Guralnick (1976) reported that educable mentally retarded (EMR) students could learn to instruct themselves to utilize a reflective problem-solving strategy on a match-to-sample task. These self-instructions were found to facilitate performance on the task.

While these reports indicate that retarded persons can learn to control their own behavior, many (e.g., Kurtz & Neisworth, 1976; Mahoney & Mahoney, 1976) concluded by identifying the need for a systematic attempt to develop self-regulatory skills in retarded persons.

Our work, supported by the BEH grant, has been just that--systematic approach to developing self-regulation in TMR students.

The first thing we needed to do was to identify what it was we were going to develop, that is, we needed to specify what we meant by self-regulation. Thoresen and Mahoney (1974) identify two general kinds of self-regulatory techniques, behavioral programming and environmental planning. The former involves programming consequences for one's own behavior while the latter requires manipulation of one's own environment so that a response is more or less likely to occur. Behavioral programming, then, includes self-reinforcement and self-punishment techniques whereas stimulus control & self-instruction procedures are environmental planning approaches. In addition to making this distinction between self-regulatory techniques, others (e.g., Kanfer, 1977) differentiate between the behavior changes that result from the application of these techniques. That is, the acquisition of new response patterns that typically involves some behavioral restraint and/or elimination of habitual response patterns has been labeled self-

control while maintaining or increasing adaptive behaviors already in the individual's response repertoire has been called self-regulation.

We decided to focus on developing behavioral programming skills, specifically self-reinforcement, in TMR students so they could regulate their own behavior (i.e., maintain or increase adaptive responses that were already in their response repertoire). Since many (e.g., Robinson & Robinson, 1976) believe that moderately retarded (TMR) students ". . . will not achieve any measure of social or economic independence as adults . . ." (p. 374), and few, if any, reports contrary to this claim had appeared we selected what we thought was the easier technique (i.e., behavioral programming) to develop and the more modest result of its application (i.e., self-regulation).

Our strategy in attempting to develop self-regulatory skills involved breaking down self-reinforcement into specific component skills; for example, self-monitoring, standard setting, self-evaluation, and self-reward. In addition we identified the ability to delay gratification and attribute consequences to internal sources as skills that would facilitate the development of self-regulatory skills as well as more positive self-concepts. We then, in a series of preliminary studies, examined each of these components to determine (a) how we could define each operationally, (b) if TMRs could perform the requisite skills, and (c) if we could develop each. Based on the results of these preliminary studies we then developed a training program aimed at teaching our students to program their behavior (i.e., develop self-reinforcement skills). Finally, we evaluated the effects of this training program in terms of (a) acquisition of self-regulatory skills, (b) task performance, and (c) self-concept.

Part I: Preliminary Studies

Assessment and Training of Self-Monitoring Skills

In addition to serving as a self-regulatory technique (i.e., stimulus control or environmental planning), self-monitoring is also one of the component skills, along with standard setting, self-evaluation, and self-reward, that is involved in behavioral programming or self-reinforcement (Kanfer, 1977). Thoresen and Mahoney (1974) identify self-monitoring as the crucial first step in the acquisition of self-reinforcement skills. That is, individuals must be able to monitor their behavior if they are going to set standards based on past performances, compare current performances to this standard (i.e., self-evaluate), and then self-administer rewards contingent on a positive evaluation. Logically, then,the first step in developing self-regulatory skills in TMR students should be to assess, and if necessary, attempt to develop self-monitoring skills in this population.

Self-monitoring, like external monitoring, can involve any number of responses to be monitored as well as various ways to record them. Both the target response and the self-monitoring response can vary from the complex (e.g., describing behavior, its consequences and antecedents) to the simple (e.g., recording a check for each problem finished). Mahoney and Mahoney (1976) were able to teach their borderline retarded subjects to count the number of homework (math) problems that they finished each night, while Kurtz and Neisworth (1976) reported that they were able to teach more severely retarded children to add a pop bead to their chain each time they finished a simple problem. Singer (1963) assessed the ability of mildly retarded students to record the consequences of their performance (i.e., scores they obtained on a game). He reported that the students were unable to perform this more complex monitoring task when provided with verbal instructions only.

In the present study both self-monitoring of the type of problems completed and of the consequences of one's own performance were assessed in a TMR population. Since it was assumed that these children could not perform this necessary self-regulatory skill with only simple instructions (see Singer, 1963), a demonstration training program was developed and evaluated. The program consisted of both live and taped modeling demonstrations which have been reported to be effective in developing conceptual responses in TMRs (see Litrownik, Franzini, Livingston, & Harvey, 1978; Litrownik, Franzini, & Turner, 1976). In order to evaluate the effectiveness of this training program, 10 TMR children were exposed to the training program, 10 served as yoked attention controls, and 10 served as no contact controls. Self-monitoring performances of all 30 children were assessed at three times; (a) prior to the intervention, (b) following training, yoked attention or an appropriate interval of time, and (c) after a retention interval of approximately 1 week.

Method

Subjects

Approximately 100 children between the ages of 7 and 11, who attended Fairhaven TMR Training Center in San Diego, California, were individually administered the Slosson Intelligence Test (Slosson, 1963). Those children (approximately 60) with mental ages between 3 and 5 years and IQs between 30

and 50 were then assessed on a number of entering behaviors necessary for participation in the study. They were required to draw a line between similar objects (9 trials), discriminate between parts of the body and shapes (6 trials), and discriminate between the numbers 1, 5, and 10 (6 trials). Children with severe visual or motor problems and children who did not meet a predetermined criterion on the three assessments (9/9, 5/6, 6/6 respectively) were excluded from the study. From the remaining pool of 45 children three groups of 10 children (5 male and 5 female) each were delineated based on a stratified match of means and variances for the variables of IQ, MA, and CA (see Table 1). One-way analyses of variance and F-max tests were used to insure that group means and variances were well matched ($p > .25$). One group was then randomly assigned to each of the three treatment conditions; (a) training, (b) yoked attention control.

Table 1

IQ, MA, and CA Means and Standard Deviations for the Three Groups

	Self-Monitor training		Attention control		No contact control	
	M	SD	M	SD	M	SD
IQ	41.4	7.6	40.2	4.8	41.5	7.8
MA	48.9	8.8	45.1	8.3	46.6	8.3
CA	120.7	21.8	111.6	18.7	114.5	21.3

Tasks

A seatwork discrimination task and a bowling game similar to the one employed by Bandura in his investigations (see Bandura, 1976), were used to assess self-monitoring skills as well as to evaluate the effectiveness of the training program. The seatwork task required the children to match a figure on the top of the page to one of two figures below that was the same. Dotted lines were provided as visual prompts to insure that the children were successful on each problem. Three matching seatwork problems were presented per page with a total of eight pages. All figures could be categorized as either parts of the body (e.g., arm, leg, ear) or simple shapes (e.g., triangle, circle, square). Each time the child drew a line between matching parts of the body (16 of the 24 problems) he or she was to self-monitor this performance by placing a red ring over a peg which would ring a bell. Following the matching of two shapes (8 of the problems) the child was to proceed to the next problem without recording.

On the bowling game the child rolled a small ball down a 1 meter alley which had 10 pins set up so that the bowling ball traveled below them over marks on the alley. After each roll a score was shown on a lighted scoreboard directly above the game. Scores were predetermined with all children receiving the same number of scores on the 15 bowling trials (2 scores of 1, 3 scores of 5, and 10 scores of 10) in the same sequence. Each time a score of 10 was obtained the child was to self-monitor by placing the ring on the peg.

Two generalization tasks were used. One assessed transfer to a new task (pursuit rotor) employing the same criterion for the self-monitoring response

(a score of 10). Scores were presented in the same manner via the lighted scoreboard as for the bowling game. The second generalization task consisted of seatwork with figures of either vehicles or letters and involved a different criterion for self-monitoring. Children were to self-monitor each time they drew a line between two vehicles.

Procedure

All children were initially pretested on both the bowling (15 trials) and seatwork (24 trials) tasks in order to assess self-monitoring skills. At this pretesting and during each subsequent testing (post, retention, and transfer) the children were given two practice trials. One required a self-monitoring response while the other did not. The children were not only instructed to self-monitor appropriately but also verbally and/or physically prompted to do so. That is, if they did not put a ring on the peg after a practice score of 10 or after a matching problem that involved a part of the body, the experimenter instructed the children to "put a ring on the peg" or took their hand and had them put a ring over the peg. Following these two practice trials no further self-monitoring corrections were made. However, task oriented prompts (e.g., "Go ahead and bowl" and "Do the next one") were provided if necessary. One to 2 weeks after pretesting the training and attention control groups were exposed to the live and taped demonstrations.

The training group was exposed to two training sessions for each task. The first session involved live demonstrations of appropriate self-monitoring on the bowling task by the female experimenter-model. Training proceeded through the following 6 steps: (1) The model bowled, received a score of 10, and self-monitored. The child was then instructed to match the model's behavior. Corrections such as "remember to put a ring on the peg when you get a 10" were provided following self-monitoring errors. This distributed demonstration with both the model and child receiving scores of 10 continued until the child matched the model on four consecutive trials. (2) The model bowled, received a score of 1 or 5 and did not self-monitor. Criterion was reached when the child matched the model's performance on four consecutive distributed demonstration trials. (3) Scores of 1, 5, and 10 were presented, requiring differential self-monitoring. Criterion was reached when the child matched the model's performance on four consecutive distributed demonstration trials. (4) The model demonstrated two consecutive trials (massed demonstration: 2) in which the scores (1, 5, or 10) were randomly presented. The child was required to match the model on both trials on two consecutive turns. (5) The model demonstrated three consecutive trials (massed demonstration: 3) and self-monitored when appropriate. The child continued until all three trials were matched on two consecutive turns. (6) The child rehearsed without prior demonstrations. Criterion was established at six consecutive correct self-monitoring trials.

Training continued either until criterion on the sixth step was reached, or 40 minutes of training had elapsed. The second session began with a repeat of the last live training step where criterion had been reached. Live training continued until criterion was reached on the last step or 10 minutes had elapsed. Then a 10 minute training tape was shown to the child. In the color videotape Sparky the Clown was shown demonstrating correct self-monitoring behaviors on the same bowling task (massed tape demonstration). The tape began with a male experimenter carefully explaining the self-monitoring procedure to Sparky. Gradually the experimenter gave fewer instructions and Sparky began to verbalize her own cues

for self-monitoring (e.g., "No ring this time" or "I got a 10, I'm going to put a ring on.") Sparky demonstrated 15 bowling trials and received the same scores that the observers obtained during pre-, post-, and retention testing.

Training of self-monitoring on the seatwork proceeded in the same manner. The first session included live distributed demonstrations of trials when (1) self-monitoring was required, (2) self-monitoring was not required, and (3) both monitoring and no monitoring were required. These were followed by live massed demonstrations of (4) 2 trials/demonstration and (5) 3 trials/demonstration. Finally, rehearsal trials (step 6) were presented. Again, training continued until criterion (6 consecutive correct) was reached at Step 6 or 40 minutes had elapsed. The second session included a maximum of 10 minutes of live demonstration and a 10 minute tape of Sparky demonstrating correct self-monitoring on 24 seatwork problems.

The 10 children in the attention control group were each yoked to a child in the training group based on a match of gender, CA, MA, and IQ. They were then given an opportunity to perform an equal number of live bowling trials, seatwork trials, and self-monitoring responses (i.e., putting the ring on the peg) as their yoked partner from the training group. However, no instructions or demonstrations of appropriate self-monitoring responses were provided. For example, during the first step the attention control children watched the model bowl and receive a score of 10. The child then bowled and received a 10 while the model directed the child to "Look at your score." These distributed demonstration trials continued until the child had bowled as many times as his or her training partner. Immediately following these bowling trials the model demonstrated a single self-monitoring response (i.e., putting the ring on the peg) and the child matched this. This continued until the attention control child had engaged in the same number of self-monitoring responses as his or her yoked training partner. These demonstrations and performances continued through each step that the yoked training group partner had progressed during each training session. In addition, the attention control children viewed two control tapes which showed Sparky either bowling or doing seatwork. Following her performance on 15 bowling trials Sparky placed 10 rings on the peg, and following the 24 seatwork problems she placed 18 rings on the peg. Thus the yoked attention control group was exposed to a taped model who bowled, completed seatwork problems, and put rings on a peg. But, the self-monitoring response was not associated with a particular score on the bowling game or with a particular type of seatwork problem.

Posttesting on the bowling game followed the 10 minute bowling tape (training or control), while the seatwork posttest immediately followed the 10 minute seatwork tape (training or control). Retention and transfer of self-monitoring responses were assessed 1 week ($\pm$ 2 days) following the seatwork posttest. Performances of the no contact group on the seatwork, bowling and transfer tasks were assessed at the same intervals as the training and attention control groups (e.g., Day 1, Day 3, Day 11).

Results

At each assessment (pre, post, retention and transfer) the number of correct self-monitoring responses (putting a ring on the peg following a 10 or following completion of a matching problem that involved a part of the body or a vehicle) and the number of self-monitoring errors of overinclusion (putting a ring on the peg following a score of 1 or 5 or following the completion of a shape or letter matching problem) were recorded. An appropriate self-monitoring score for each

task at each assessment was obtained by subtracting two times the number of over-inclusion errors from the number of correct self-monitoring responses. This correction yielded a score of zero if the child self-monitored on every trial (e.g., 24 seatwork or 15 bowling) or if s/he never self-monitored. Thus, at each assessment scores could range from -10 (i.e., no correct self-monitoring responses and 5 errors of overinclusion) to 10 (i.e., 10 correct self-monitoring responses and no errors) on the bowling game and from -16 to 16 on the seatwork task.

Pretest-Assessment

The appropriate self-monitoring scores, correct self-monitors, and errors of overinclusion for each child at pretesting were subjected to a one-way analysis of variance with three levels (Groups: Training, Attention Control, No Contact Control). No significant or near significant effects for groups were found for any of the dependent measures (all $\underline{F}s < 1$). Thus the groups were self-monitoring at approximately the same level prior to the presentation of the treatment manipulations. In fact, all groups were performing at a chance level (see Figures1 and 2).

Assessment of Training

For the first live training session on the bowling task all 10 training children did reach criterion at the sixth and final step within the 40 minutes allowed. On the other hand, 4 of the training children required a full 40 minutes of training on the seatwork task and still did not reach criterion on the sixth step. Though no significant differences between groups at pretesting were found, we did want to take these initial performances into account in subsequent analyses of appropriate self-monitoring at post-, retention and transfer testing. Appropriate self-monitoring scores for each child on the bowling game and seatwork task at post-, retention and transfer testing were subjected to a one-way analysis of covariance with the pretest scores serving as the covariate. Significant treatment effects on the bowling task at post, retention and transfer assessments were found ($\underline{F}$ = 81.3, 79.6, and 40.1 respectively, 2/26 $\underline{df}$, $\underline{p} < .01$). Similar significant treatment effects for post, retention and transfer self-monitoring performances on the seatwork tasks emerged ($\underline{F}$ = 12.5, 10.8, and 14.1 respectively, 2/26 $\underline{df}$, $\underline{p} < .01$).

Examination of Figures 1 and 2 and Tukey's multiple comparison of adjusted means reveal that the training group significantly ($\underline{p} < .01$) outperformed both control groups, while performances of the two control groups did not differ.

Discussion

It appears, based on pretest performances that this TMR population could not initially observe and differentially monitor the consequences of their behavior or the type of problem they had just completed. In the only other study to assess self-monitoring skills systematically, Singer (1963) reported that educable mentally retarded (EMR) students could not report the score that they obtained when playing a game. Our results along with those of Singer suggest that neither EMR nor TMR students can monitor the consequences of their performance when merely instructed to do so. Additionally, TMR students do not appear to be able to differentially monitor the kind of problem or activity that they have completed. These failures are even more pronounced when we consider that the two control groups were assessed four times on each task, and each assessment included two practice trials and detailed instructions. Although they were provided with a

Figure 1

Mean number of appropriate self-monitoring responses for each group on the bowling and pursuit rotor games.

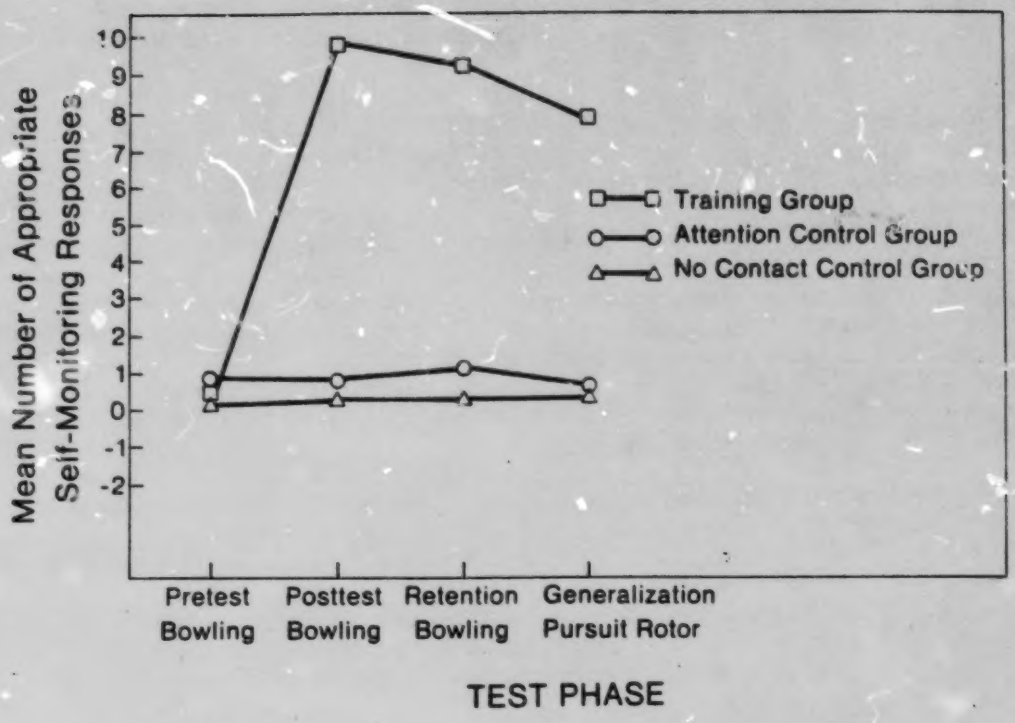
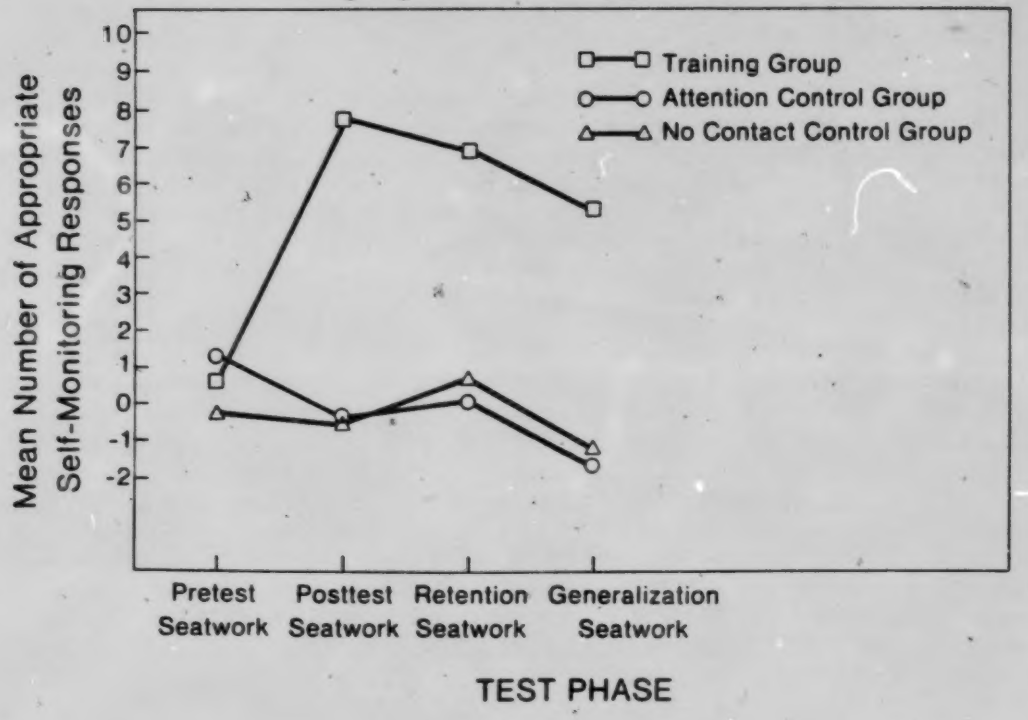


Figure 2

Mean number of appropriate self-monitoring responses for each group on the seatwork task.



total of eight shaping trials and four sets of instructions for each task, these two control groups appropriately self-monitored at a chance level during all assessments.

Self-monitoring requires observation of covert and/or overt events, a discrimination cued by these events, and a self-monitoring response (see Thoresen & Mahoney, 1974). In previous case reports (e.g., Kurtz & Neisworth, 1976; Mahoney & Mahoney, 1976; Nelson et al. 1976) retarded individuals were taught to self-monitor (e.g., make a checkmark on a page, add a pop bead to a string) following a single overt event or cue (e.g., completion of a task, face-touching). A more complex discrimination was required of the moderately retarded students in the present investigation. Not only did they have to observe whether they had completed a task (e.g., matching seatwork) or engaged in a single response (e.g., bowled) but they also had to observe and discriminate between the type of task completed (e.g., parts of the body or shapes) and the consequences of their behavior (e.g., a score of 1, 5, or 10).

Though these TMRs could not perform these more complex self-monitoring tasks initially, we did find that the students who were exposed to the brief 1 hour demonstration training program were able to acquire, retain, and transfer these skills. Such complex differential self-monitoring is more functional as it can be adapted to a greater number of relevant situations. That is, differential self-monitoring is required if a student is to keep track of correct vs. incorrect problems, high vs. low scores, or whether the task was completed or not within a specified time.

Our population was restricted to TMR students of a certain mental age (3 to 5 years) who did not evidence severe visual or motor handicaps. In addition, we excluded students who could not perform necessary prerequisite behaviors (e.g., draw a line between two objects, discriminate between shapes and parts of the body, and between the numbers 1, 5, and 10). While the results of the present study can not be generalized to TMR students with severe visual and/or motor handicaps, we can assume that a student who has acquired the necessary entering behaviors will benefit from the demonstration training program. Thus it appears that most TMR students can learn to monitor accurately such relevant consequences of their behavior. Acquisition of differential self-monitoring skills by TMR students specifically, and retarded students in general, can relieve classroom instructors of the task of always having to externally monitor each students' performance. If instructors can rely more on their students to monitor their own performances then additional time should be available for instruction (e.g., individual programming), while at the same time the retarded individual would have an opportunity to function more independently.

In addition to fostering independence and aiding classroom instructors, self-monitoring may also lead to desired changes in the behaviors that are being observed. That is, self-monitoring alone may function to some degree as a self-regulatory technique (i.e., environmental planning or stimulus control). Though there is some indication (see Nelson et al. 1976) that self-monitoring does positively affect performances in an older retarded population, its effectiveness has not as of yet been demonstrated unequivocally. Since we now know that complex self-monitoring skills can be acquired by TMR students, future research should attempt to determine if these skills do, in fact, lead to changes in the monitored response. In any case, the acquisition of self-monitoring skills by TMR students is a first step in the development of self-regulation.

Acquisition of Standards for Performance

The present report involves the second identified component, standards for performance. As mentioned previously, retarded individuals typically have others set minimal standards for them. If the setting of appropriate internal standards for performance is the most important self-regulatory component as claimed by Bandura (1977) and Kanfer (see Kanfer, 1977; Spates & Kanfer, 1977) then it is understandable why retarded persons fail to effectively control or regulate their own behavior. Thus retarded persons must be given the opportunity to set appropriate standards for their own performance if they are to function more independently.

How can these important internal or self-set standards be acquired or developed? Bandura (1977) claims that our standards for performance can be based on (a) social referents (i.e., observing how others perform and the standards they set), (b) our own past performances, or (c) a combination of the two. While numerous studies (see Bandura, 1977) have shown that normal developing preschool and elementary school-aged children can acquire self-reward patterns via observation of others (i.e., via social referents), there have not been any reports of retarded individuals acquiring standards in this manner. Thus our first aim was to determine if trainable mentally retarded (TMR) students could adapt standards for their performance based on the observation of others. In the present study we asked the students to indicate what they were "trying for" or what they "wanted to get" on their next turn rather than inferring standards from self-reward patterns (see Bandura, 1977). In addition we also recognized that it may not always be appropriate for an individual, especially a retarded person, to set standards based solely on the performance of others. Thus, we also attempted to teach our TMR students a relational concept, based on their own past performances, that could be used by them to set appropriate standards for their performance.

Methods

Subjects

Twelve male and 12 female students from Fairhaven School in San Diego, California served as subjects. They were all administered the Slosson Intelligence Test (Slosson, 1963) 4 months prior to participation in the study. Three groups of eight students each were established based on a stratified match of means and variances for IQ, MA, and CA (see Table 1). One group was then randomly assigned to each treatment condition; (a) Training 1 (Live/Film), (b) Training 2 (Film/Live), and (c) Control.

Table 1

IQ, MA, and CA means and standard deviations for the three groups

	Training 1 (Live/Film)		Training 2 (Film/Live)		Control	
	M	SD	M	SD	M	SD
IQ	39.6	7.1	40.5	6.3	40.4	7.0
MA	46.4	6.8	46.4	9.8	46.3	9.7
CA	120.1	17.8	115.6	22.4	118.8	24.4

Tasks and Apparatus

Students were escorted to a mobile laboratory located on the school grounds. The laboratory contained two rooms, experimental (2.1m X 2.9m) and observation (1.3m X 2.3m). Once in the experimental room the students had an opportunity to play three games; bowling, pinball and picture story. Students rolled a small black plastic ball down a 1 meter alley on each bowling game trial. At the end of the alley ten plastic bowling pins were suspended so that the ball rolled beneath the pins. Wires from the bowling game to an electric scoreboard positioned just above the pins were provided to give the impression that the score flashed on the electric scoreboard was related to where the bowling ball had passed beneath the pins. In fact, the scores (1-10) shown on the scoreboard were activated by an observer in the observation room in order to present them in a predetermined order.

The pinball game also had wires running from it to the electric scoreboard. After each pinball trial an observer flashed the predetermined score (1-10) on the same scoreboard.

The picture story game was adapted from MacMillan (1975) and involved the identification of one of three choice pictures that "went with" a sample picture. All three choice stimuli could, in fact, go with the sample as all four pictures were of animals. Two sets of eight trials were utilized with students being told after the first set that they were correct on 4 of 8 trials while for the second set they were told that on 6 of the 8 trials they had identified the correct picture.

A yellow felt scoreboard (.9m X .3m) which contained the numbers 1 through 10 arranged vertically with the 10 at the top was used by the students to record their scores as well as set their own standards. The standard that the student set was indicated by placing a green arrow next to the score that they were "trying for." A red star was placed next to the score that the child actually obtained after setting a standard. Blue circles were used to record (i.e., self-monitor) scores received on practice trials prior to the setting of standards.

Procedures

All students were brought individually to the mobile laboratory with those in the two training groups having an opportunity to watch a brief 10 minute color videotape after they entered the experimental room. On this tape five colorful clown models were shown entering the mobile laboratory. Each then took a turn playing the bowling game. Before each clown bowled s/he said "I'm going to try for a six." or "I think I'll shoot for a six." while placing the green arrow next to the "6" on the yellow felt scoreboard. Each clown bowled and each met their standard. That is, they received a score of "6" on the electric scoreboard and placed a red star next to the "6" on the felt scoreboard.

Immediately following observation of this tape the training group children were given an opportunity to set a standard for their performance on the bowling game. Control students were given the opportunity to bowl and to indicate what score they were "shooting for" but did not watch the tape of the clowns prior to their performance. This first phase of the study constituted our assessment of the ability of these TMR students to adapt standards based on the observation of others.

On the first day of this second phase students in the first training group individually observed a 12 minute color videotape in which three clowns (1 male, 2 females) demonstrated the concept. Each of the nine demonstrated trials (three trials per clown) included two practice rolls with the clown model receiving predetermined scores that were two digits apart (e.g., 3 and 5, 6 and 8, etc.). Following each practice trial the model recorded the score obtained by placing a blue ring around the number on the yellow felt scoreboard. The clown then verbalized the concept "between" while placing the green arrow next to the score he or she was "trying for" on the next roll. On this final roll the clown met his or her standard and placed a red star next to the number on the scoreboard. Students in the second training group, on the other hand, were exposed to live demonstrations of this concept. The experimenter-model bowled twice, received scores that were two digits apart, recorded these scores, set her standard in between the two predetermined scores while verbalizing the concept, bowled again, and met her standard. Students then had an opportunity to match the model's performance, receiving the same predetermined scores as the model. These demonstrations and student performances continued until the model was matched on four consecutive trials or until 20 minutes of training time had elapsed.

Following the 12 minute tape and the live demonstration training the student's ability to apply this concept to standard setting on the bowling game was assessed on five trials (Test Session 1). Control students were also assessed on this first day of the second phase without any prior training. On the second day the training procedures were reversed for the two training groups. A five trial assessment (Test Session 2) followed training on this second day, or in the case of the control group, occurred on this second day without prior demonstration training. Six days ($\pm$ 1 day) later, students' standard setting based on this concept was again assessed on five bowling trials (Test Session 3). On the following day the students' ability to transfer the standard setting concept to one picture story trial (Test Session 4) and five pinball trials (Test Session 5) was assessed.

On each assessment trial students performed twice and were required to put a blue circle around a number on the felt scoreboard. They were prompted verbally until they did place the circle on the scoreboard. They were then instructed to place the green arrow next to the number that they "were going to try to get next time." If the child did not place the arrow next to a number the experimenter continued asking the child to "show me what you are going to shoot for this time." Thus on each trial students were required to set a standard by placing the arrow or indicating where they wanted the arrow placed on the scoreboard.

Results

Data were collected on where the students set their standards on each trial as well as the appropriateness of their self-monitoring following each practice trial. A correct standard for the first phase of the study, social referent, was defined as the same standard that the five clown models set, that is a six. For the second phase of the study, an appropriate or correct standard was defined as the score between the two scores obtained on the two immediate prior practice trials.

Social Referent

After observing the clown models set their standar at six, 11 of the 16

students in the training groups set their standard at six. None of the children in the control group set their standard at this score. A chi-square analysis revealed that the training groups were more likely to set their standard at six, the standard the clown models set, than the control group ($\chi^2(1) = 10.16$, $p < .01$).

Past Performance

The students set their standard during this phase after they had performed on two practice trials. Following each practice trial they were to monitor the consequences of their performance (i.e., the score obtained) by placing a blue ring around the score earned. Since the concept for setting the standard was between the two scores, monitoring on these two practice trials had to be accurate in order for students to utilize the concept in setting their standards. An attempt was made to insure correct self-monitoring by all children. After each bowling trial or pinball trial the student was told to "Put the blue ring on the score you just got." and the score remained on the electric scoreboard until a blue ring was placed on one of the numbers on the yellow felt scoreboard. The number of correct standards set (i.e., between) at Test Sessions 1, 2, 3, and 5 was subjected to a one-way analysis of covariance with the number of correct self-monitoring responses serving as the covariate. Significant ($p < .01$) treatment effects at Test Sessions 2, 3, and 5 were found. Examination of Figure 1 and Tukey tests for significant gaps indicate that both training groups differed significantly ($p < .05$) from the control group at each of these sessions while no differences between the training groups were evidenced.

Data from Test Session 4 (Picture Story task) was analyzed nonparametrically as only one trial was presented. A chi-square analysis of the number of children who set their standard on the one picture story trial based on the concept "between" show that only the first training group differed significantly ($\chi^2(1) = 7.28$, $p < .01$) from the control group.

Discussion

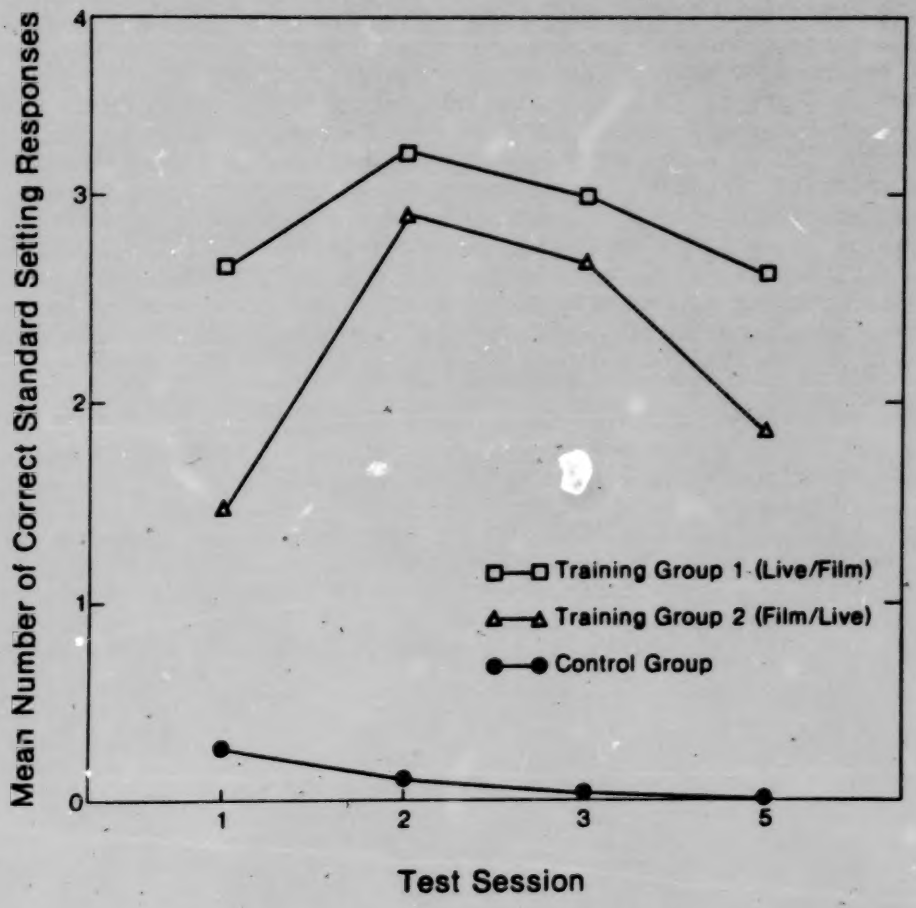
The results of this study can be summarized as follows; (a) TMR students can learn to set a standard for their performance based on the observation of others setting standards, and (b) they can also acquire, retain, and transfer a concept via live and film demonstration that allows them to set a standard based on their own past performances.

While many previous studies (see Bandura, 1977) report that nonretarded school-aged children can acquire standards of performance via observation of others, the present study is the first to indicate that TMR students can acquire standards in the same manner. This finding is not surprising as retarded persons do typically look to others for cues as to how they are to respond in a situation (see Zigler, 1966).

In most situations the observation of others by a retarded individual would lead that individual to set inappropriately high standards. That is, if the person being observed is not retarded and thus functioning at a higher level than the retarded observer, then the standards acquired would be unrealistically high. Thus, if we do give retarded persons an opportunity to set their own standards we must be sure to provide them with models of comparable skill.

Figure 1

Mean number of standards set based on the concept "between" (adjusted for self-monitoring) by the three groups at Test Sessions 1, 2, 3, and 5.



Of course there is another alternative. Rather than setting standards for retarded persons and/or allowing them to observe only other retarded persons (i.e., limiting them to special classes or groups), we could teach them to set standards based on observations of their own performance. In the second phase of this study we attempted to teach TMR students a relational concept (between) that would allow them to do just that.

This concept was acquired via demonstration, retained and transfered as have other complex concepts (see Litrownik, Franzini, Livingston, & Harvey, 1978; Litrownik Franzini, & Turner, 1976). In this instance the concept was utilized by the students to set standards for their performance.

In contrast to previous studies examining standard setting in nonretarded populations (e.g., Bandura, 1977), self-reward patterns were not used to infer standards in the present study. Instead, a direct assessment of standards was accomplished. We chose to assess standards directly as it has been suggested that self-reward patterns may be a function not only of standards but also of causal attributions for performance on a task (see Kanfer, in press). Though we attempted to set up the games so that it appeared that students were responsible for the scores obtained, there is some doubt as to whether we can assume that the students did attribute scores to internal causes. Moreover, retarded individuals have been found to be more external in their locus of control orientation (Morena & Litrownik, 1974) and are thus likely to attribute results of their performance to external causes. When causality is attributed to external sources self-reward patterns do not correspond directly to standards set. Thus we decided to assess the standards directly.

Finally, we do not know if the students understood the meaning of the standards that they set since we did not look at the effects of these standards on other behaviors. We did observe that many of the students appeared pleased when they met their standards but no other indication of the meaningfulness of the standard was obtained. In any case, this study demonstrates that TMR students will set standards for their performance based on the observation of others, and that they can learn to set standards based on their own past performance. It remains for future studies to determine what kind of self-set standard is most appropriate and/or meaningful (i.e., lead to increased performance) for retarded students.

Acquisition of Self-Evaluation and Self-Reward Skills and Their Effects on Performance

There have been numerous reports (see Bandura, 1976) indicating that non-retarded persons can learn to reward themselves contingently (i.e., based on some predetermined standard). In addition, Bandura (1976, 1977) reports that self-administered rewards are as effective as externally administered rewards in maintaining target responses while both are superior to no reward conditions. Unfortunately, there is little, if any, evidence indicating that retarded persons can acquire self-reward skills, much less use these skills to maintain other desired responses.

Helland, Paluck and Klein (1976) did find that mildly retarded institutionalized adults could learn to self-administer rewards when provided with a specific cue. They also report that task performance (paper collating) was maintained at a level equal to that during external reward administration and superior to a non-reward period. As indicated, the self-administration of rewards was cued by an external stimulus. That is, the experimenters put a pink sheet of paper following each set of 10 collated papers. When the retarded adults came to a pink sheet they were instructed to take a reward. While this report suggests that retarded persons might be able to effectively reward themselves, there is still some questions as to whether they can engage in this self-regulatory component skill without a specific cue being presented externally.

In this preliminary study we hoped to train a group of TMR students to evaluate their own performance and then to conditionally administer fully accessable rewards to themselves. In addition we attempted to determine if these self-regulatory component skills (self-evaluation and self-reward) had any effect on task performance.

Method

Subjects

Subjects in this experiment were 16 retarded students, 10 males and 6 females, who attended Fairhaven TMR Training Center in San Diego, California. All students had been assessed on the Slosson Intelligence Test (Slosson, 1863) approximately 7 months prior to their participation in this study (mean MA = 3.91 years, mean IQ = 37.94). In addition, potential participants had been screened to insure that they could discriminate between various colors, numbers, letters, and shapes. Students were assigned to either a training or control group based on a stratified match of means and variances for MA, CA, and IQ (see Table 1).

Table 1

IQ, MA, and CA Means and Standard Deviations for the Two Groups

	Training		Control	
	M	SD	M	SD
IQ	39.4	6.7	39.8	6.0
MA	44.6	6.1	46.3	8.8
CA	117.2	22.4	118.2	20.0

Task and Apparatus

The training task (symbol-matching) required the children to cross out figures on a mimeographed page that matched the picture at the top of the page. Each page contained various numbers, letters, and shapes in addition to a sample figure at the top of the page. The task presented to the child was to cross out all of the figures that matched the sample before a bell rang. The bell sat on top of the table where the child was working. It was controlled by the experimenter with a button under the table, thus allowing the experimenter to unobtrusively control the number of figures that were crossed out by each child. After each trial, the experimenter informed the child as to whether or not s/he had successfully completed the page before the bell rang. In front of both the experimenter and the child was his/her felt scoreboard labeled with the name of the child and the experimenter, respectively. Lying in front of each scoreboard was a row of eight circular yellow "happy faces" and a row of eight green squares, each made of felt and approximately the same size. If the child crossed out all of the matching figures before the bell rang, s/he was to put a felt "happy face" on the scoreboard to indicate that s/he had done a good job (successful trial; positive self-evaluation). If the child failed to complete the task before the bell rang, s/he was to put a green felt square on the scoreboard to indicate to himself/herself to try harder on the next trial (failure trial; negative self-evaluation). This differential self-monitoring constituted the self-evaluative phase of the experiment. Following a positive self-evaluation during the self-reward phase of the experiment, the child was to reinforce himself with one edible from either of two clear plastic cups, each containing 20 edibles that were placed within the child's reach. Rewards were individualized for each child based on prior assessment in which the child was allowed to choose his favorite foods from approximately 15 food samples, including various candies, cereals, fruits and cheeses. Following a negative self-evaluation, the child was to abstain from self-reward. Thus, self-reward was properly self-administered only after the child had successfully crossed out all of the matching figures before the bell rang and had correctly self-evaluated his performance as being positive by placing a "happy face" on his scoreboard.

The transfer task (block design) required the child to match a block design constructed by the experimenter. As in the training task, the instructions to the child were to try to complete the task before the bell rang. The experimenter constructed a prearranged design in the upper horizontal groove of a tray using one-inch square colored blocks. After giving the child the necessary blocks, the experimenter then instructed the child to make an identical design in the lower groove. While the first two designs contained only five blocks, each of the remaining designs contained ten blocks. Six 10-block designs of varying difficulty were presented twice to each child in random order. The child was allowed either 15 or 30 seconds to complete each design. The experimenter timed each trial with a stopwatch and signalled the end of the trial by ringing the bell. At the end of each trial, the experimenter informed the child as to whether or not the designs were identical and whether or not the child had completed the design before the bell rang. The child was then to self-evaluate and self-reinforce as on the training task.

Procedure

Training and Testing. On the first day each child was brought individually to the mobile laboratory which was parked on the school grounds by either the experimenter or the observer. The child first selected two edible rewards from among 15 or 20 that were available. The child was then escorted into the experimental

room where s/he was seated next to the experimenter at the table. During this first session each child's self-evaluative and self-reward capabilities were pre-assessed on the training and transfer tasks. On the symbol-matching or training task, the child was told to try to cross out all of the pictures that looked like the picture at the top of the page before the bell rang. It was explained that if the experimenter told the child that s/he had completed the task, s/he was to place a "happy face" on his board to show that s/he had done a good job and then to take one treat. On the other hand, if the child did not finish the task, s/he was to put a green square on his board to remind himself "to try harder next time" and not to take a treat. Each child was given two practice trials (one success and one failure) in which the experimenter instructed the child and prompted correct responses. After the two practice trials, the instructions were repeated and the child was given 12 test trials. On each trial the experimenter rang the bell after the child had crossed out a pre-determined number of figures. In this manner the child was presented with 6 failure and 6 success trials in random order. The child was prompted, if necessary, to continue working on the task until the bell rang, to cross out only matching items and to make a self-evaluative response, i.e., the experimenter pointed in the direction of the squares and the "happy faces" and said, "Put one of these on your board."

The block design or transfer task was administered immediately following the training test. The child was told that the experimenter was going to make a design with the colored blocks and that, when it was his/her turn, the child was to use his/her blocks to make an identical design. After receiving the instructions, the child was given two practice trials using five blocks of identical color. The experimenter allowed the child to succeed on the first trial by waiting until the child had completed the design before ringing the bell. On the second trial, the experimenter rang the bell after the child had completed only three blocks. On both trials the experimenter instructed and prompted the child so that the self-evaluative and self-reward responses were appropriate. Following the two sample trials, the child was agin instructed as to how to correctly self-evaluate and self-reward. The child was then given 12 test trials, each consisting of either 15 or 30 seconds and involving 10 blocks. Thus, on the transfer task, the success or failure of the subject was not directly controlled by the experimenter allowing the performance of the child to vary with his ability and effort. After each test trial, the child was told whether or not he had correctly completed the design before the bell had rung. As on the training task, the child was prompted, if necessary, to continue working during the trial and to make a self-evaluative response after the trial.

On the following day (Day 2) each child in the training group was brought individually to the mobile laboratory. The child first selected an edible reinforcer which was given at the end of the session. During this session, each child in the training group received a maximum of 30 minutes of self-evaluation training. The experimenter first explained the task to the child, saying that, if s/he were able to cross out all of the pictures that looked like the picture at the top of the page before the bell rang, s/he would put a "happy face" on his board to show that he had done a good job (success trial). If he did not finish crossing out the correct pictures before the bell rang, he would put a green square on his board to remind himself to try extra hard the next time (failure trial). The experimenter then modeled three consecutive failure trials, each time ringing the bell after crossing out a predetermined number of figures. The experimenter also verbalized his actions, i.e., "I am working as fast as I can," "I didn't finish the whole page," "When I don't finish the whole page, I put a green square on my board to

remind myself to try extra hard next time." After the three modeled trials, the child was instructed to do just what the experimenter had done. If necessary, the child was prompted to continue working and to cross out only the pictures that looked like the picture at the top of the page. After the child completed a predetermined number of figures, the experimenter rang the bell and told the child that he had not finished the page. He then asked the child, "What do you do next?" If the child correctly put a green square on his board, the experimenter verbally reinforced the child. If the child put a "happy face" on his board, the experimenter reminded the child that he should put a green square on his board when he did not finish the page before the bell rang. In the event that the child did not put either the "happy face" or the green square on his board, the experimenter first verbally prompted the child to place a green square on his board and, if necessary, handed the child a green square and told him to place it on his board. This procedure of instructing and prompting was continued until the child performed three consecutive failure trials, correctly self-evaluating without a prompt or correction.

The experimenter then modeled three consecutive success trials, each time ringing the bell after he had crossed out all of the matching figures on the page and placing a "happy face" on his/her scoreboard. As before, the experimenter also verbalized each of his actions. After the experimenter modeled the three trials, he told the child to do just what he had done. After the child had completed each page, the experimenter rang the bell and told the child in a congratulatory tone that he had finished the page and asked him what he was supposed to do next. As before, the child was verbally reinforced for a correct response or prompted and corrected if incorrect. The child continued in this manner until three consecutive trials were correctly performed without a prompt or correction.

The experimenter then modeled one failure trial, followed by two success trials, followed by another failure trial. As before, the experimenter explained his responses as he performed. The task was then again explained to the child and he was allowed to perform. The experimenter controlled the success or failure of the child by ringing the bell after the child had crossed out a predetermined number of figures. During this series, the experimenter presented the child with a randomized series of both success and failure trials. After each trial, the child was asked what he was supposed to do next. If the child responded correctly, he received verbal praise. If the child did not respond or responded incorrectly, prompts and corrections were used as before. Training group children continued in this manner until they reached a criterion of 9/10 correct trials without prompts or corrections or until 30 minutes had elapsed. The self-evaluation training thus progressed from failure-only trials, to success only trials, to combinations of success and failure trials.

Training and control group children were brought individually to the mobile laboratory on the third day. After selecting a edible reinforcer the children in the training group continued self-evaluation training, beginning at the last step at which they had reached criterion the previous day. Training was continued for 10 minutes or until the child had performed 4/5 correct trials without prompting or correcting on the last step of self-evaluation training. At this point, the child was assessed on self-evaluation on both the symbol-matching and block design tests. The tests were identical to those administered in the pretest with the exception that no reference or expectation was made to self-reward. Edible rewards were not available to the child during these assessments but were given to the child at the end of the session.

Children in the control group received no training on this day, but were administered a test identical to that given the training group.

On the fourth day only training group children were seen. They selected two reinforcers that they would work for during the session, first receiving 10 minutes of self-evaluation training, again beginning at the last successful step completed on the previous day. Training continued until the child performed 4/5 correct trials without prompting or correcting or until 10 minutes had passed.

After the self-evaluation training was completed, self-reward training began. The two cups of edible reinforcers chosen by the child were placed on the table in front of the experimenter. The child was told to put a "happy face" on his scoreboard. Immediately after the child put the "happy face" on his board, the experimenter gave the child one of the reinforcements, saying, "Whenever you put a "happy face" on your board, you get one treat." This trial was then repeated. The child was then told to put a green square on his board. After the child had complied with this instruction, he was told that he did not receive a treat after he placed a green square on his board. This trial was then repeated. The experimenter then instructed the child through four additional trials, alternating requests for placement of a "happy face" or a green square and administering reinforcement only after the child had placed a "happy face" on his scoreboard. The cups of food were then moved next to the child and he was told to take one treat after he put a "happy face" on his board and not to take a treat after he put a green square on his board. The child was then presented with the same series of trials that he had received when the experimenter administerd the rewards. On each trial, the experimenter instructed the child as to which marker to put on his scoreboard and whether or not to reward himself. This was followed by a series of trials in which the experimenter instructed the child as to which marker to place on his board, but did not instruct the child to self-administer the rewards. If the child did not reward himself within 3 seconds after putting a "happy face" on his scoreboard, the experimenter asked, "What do you do next?" If the child still did not know what to do, the experimenter told the child to take a treat after he put a "happy face" on his board. Any attempts by the child to reward himself inappropriately, i.e., after putting up a green square or taking more than one reinforcer, were corrected by the experimenter. Correct trials were verbally reinforced by the experimenter. In the case of correct non-reward, the experimenter waited 3 seconds before informing the child that s/he was correct. Trials were randomly presented in this manner until the child performed four consecutive correct trials without prompting or correction.

Each child in the training group was then tested on self-reward. The experimenter first instructed the child through two demonstration trials in which the child was informed as to which marker to place on his board and whether or not he should reinforce himself. One trial of the demonstration involved the child putting a "happy face" on his scoreboard, while the other demonstration trial required the child to put a green square on his board. The experimenter then reminded the child when to correctly self-reward followed by twelve test trials requiring the subject to place the requested figure on his scoreboard and reinforce himself appropriately. The child was prompted only once to reinforce himself after putting a "happy face" on his board. No other feedback was given to the child during the test.

After the completion of the self-reward test, each child in the training group began training in self-evaluation plus self-reward. The experimenter first modeled two failure trials, ringing the bell before he had completed the page, putting a

green square on his scoreboard and verbalizing that he did not receive a treat. The child was then instructed to perform the task just like the experimenter. Again the experimenter rang the bell before the child completed each page, told the child that he had not finished the task before the bell rang, and asked him what he was supposed to do next. The child was prompted to make a self-evaluative response as in the self-evaluation training. In addition, the child was verbally reinforced for not taking a treat or was corrected if he attempted to self-reward after the failure trial. The child continued to perform in this manner until he correctly self-evaluated and abstained from self-reward on four consecutive failure trials without prompting or correcting by the experimenter.

The experimenter then modeled two success trials, ringing the bell after he had completed the page, putting a "happy face" on his scoreboard, and taking one of the two treats. Again, the child was instructed to perform just as the experimenter. The bell was rung after the child completed each page and the child was prompted and corrected, as necessary, to perform the correct self-evaluative and self-reinforcing responses. The child continued to perform the task until he correctly self-evaluated and self-rewarded on four consecutive trials without prompting or correction.

The experimenter then modeled one failure trial, followed by two success trials, followed by a failure trial. The child was then presented with a random series of success and failure trials and was prompted and corrected as before. Self-evaluation plus self-reward training continued until the child was able to perform 9/10 trials correctly without prompting or correcting on the final series or 30 minutes had passed since the beginning of the session.

Training and control group children were both seen on the fifth day. After selecting two reinforcers the children in the training group were given self-evaluation plus self-reward training beginning at the last step at which they had reached criterion on the previous day. Training continued until the child reached criterion of 9/10 correct trials on the final step or 10 minutes had passed. At this time the child was posttested on self-evaluation plus self-reward on both the symbol-matching and block design tasks. The tests were identical to those administered during the pretest.

The children in the control group received no training and were posttested on self-evaluation plus self-reward responses on the two tasks following selection of two reinforcers that they wanted to work for during the session.

Four days after the posttest, each child was administered the test for self-evaluation plus self-reward on the symbol-matching and block design tasks. The tests were identical to those administered to both groups on the pretest and posttest.

Trained Control. One week after the retention test (Day 9) 6 of the 8 control students were exposed to the training program (i.e., days 2, 4 & 5). On the fifth day self-evaluation and self-reward performances were again assessed.

Scoring. An observer who sat behind a one-way mirror recorded correct self-evaluation and self-reinforcement trials during training and testing. A correct self-evaluative response consisted of the placement of a single appropriate marker on the child's scoreboard after the child had performed the trial. A correct self-evaluation plus self-reward response required the child to both self-evaluate and self-reward appropriately. The observer also recorded prompts given by the

experimenter during the tests, pertinent verbalizations by the child during testing and training, and the time necessary for the child to complete each block design.

During the administration of the block design transfer task, the experimenter recorded the time taken by the child to complete the design and the position of the blocks placed by the child. Since both the observer and the experimenter recorded the time taken by the child to complete the design, the reliability of timing could be assessed. In addition, the scoring of block placement allowed the child's performance to be assessed in terms of serial position, sequential association, number of blocks placed and number of designs correctly completed.

Results

At each assessment, (pre, self-evaluation post, self-evaluation and self-reward post, and retention) the number of correct self-evaluative responses on the training (symbol matching) and transfer (block design) tasks was recorded. In addition, at each assessment (except the self-evaluation posttest) the number of correct self-evaluation and self-reward trials was recorded. Four measures of performance on the block task were obtained based on where students placed the blocks; (1) total number of blocks placed, (2) number of blocks placed in the correct serial position, (3) number of blocks placed in the correct sequence (i.e., sequential association), and (4) total number of designs correctly matched.

Assessment of Training

The number of correct self-evaluative trials and the number of correct self-evaluative and self-reward trials at pretesting for each student was subjected to a one-way analysis of variance with two levels (Groups: Training, Control). No significant or near significant effects for groups were found for these two dependent measures (both Fs < 1). Thus the two groups were evaluating and rewarding themselves at approximately the same level prior to the introduction of our treatment manipulation.

We did want to take these initial performances into account in subsequent analyses of appropriate (a) self-evaluation and (b) self-evaluation and self-reward at post and retention assessments. Correct self-evaluations for each child at the two post and one retention assessments were subjected to a one-way analysis of covariance with the pretest scores serving as the covariate. A significant treatment effect on the training task (i.e., symbol matching) at the second posttest was found ($F = 5.93$, $df = 1/13$, $p < .05$). In addition, at retention testing the treatment effect approached significance ($F = 4.66$, $df = 1/13$, $p < .10$). On the other hand, self-evaluative performances on the transfer task (block design) differed significantly at the first posttest ($F = 6.59$, $df = 1/13$, $p < .05$) and approached significance at the second posttest ($F = 4.42$, $df = 1/13$, $p < .10$). Examination of Figure 1 along with these results indicates that the training group appeared to develop self-evaluative skills which were transferred to a second task.

The number of correct self-evaluation and self-reward trials for each student at post and retention assessments was similarly subjected to a one-way analysis of covariance with pretest performances (i.e., correct self-evaluation and self-reward trials) serving as the covariate. A significant treatment effect for the symbol matching task was found at retention testing ($F = 8.39$, $df = 1/13$, $p < .05$) while the difference at posttesting approached significance

Figure 1

Correct self-evaluations on each task.

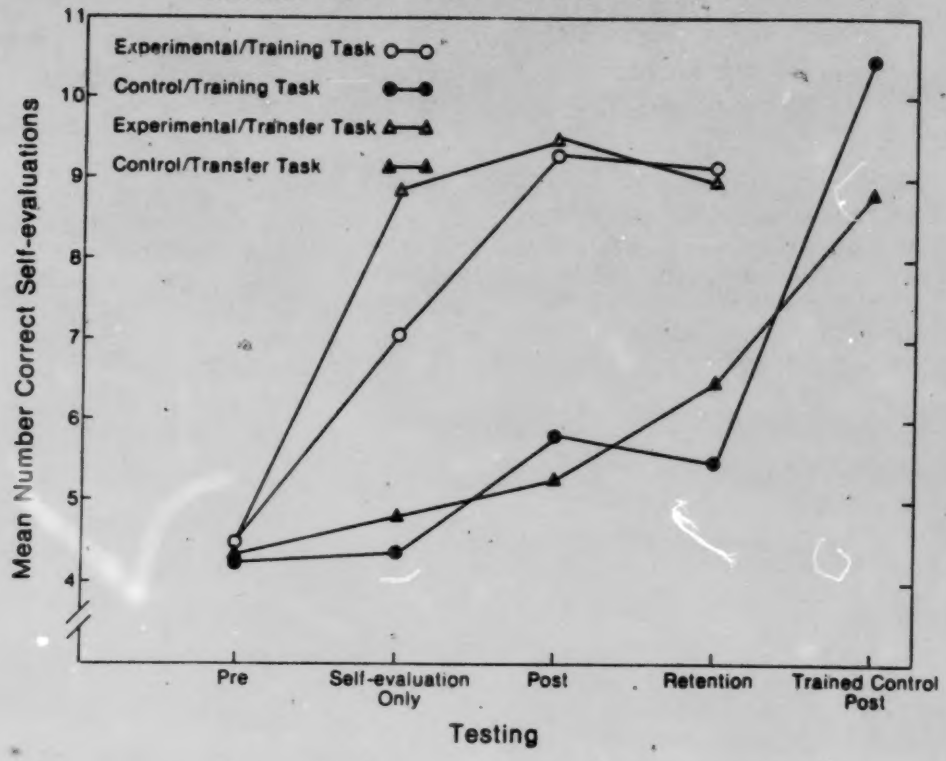
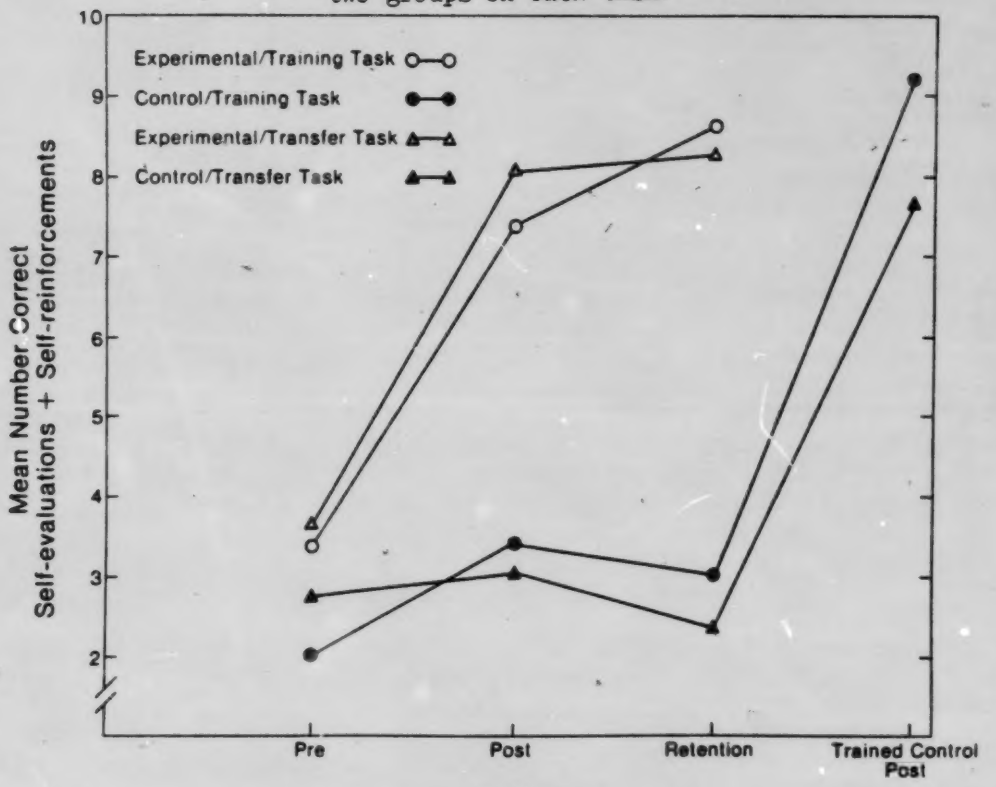


Figure 2

Correct self-evaluations and self-reward trials for the two groups on each task.



($F = 4.17$, $df = 1/13$, $p < .10$). On the transfer task, significant differences were found for both post and retention assessments ($F = 5.86$ and 13.39, respectively, $df = 1/13$, $p < .05$). Examination of Figure 2 and of the above reported results indicates that the group exposed to our training program acquired and generalized self-evaluation and self-reward skills.

A replication of this training effect can be observed when we examine the performances of the control group after they (6 of 8) were trained (see Figures 1 and 2).

Effects of Training on Task Performance

In order to evaluate the effects of exposure to our training on task performance the four dependent measures from the block design task were analyzed via a two group (training and control) discriminant analysis. This multivariate technique, which is analagous to a one-way univariate analysis of variance, maximizes differences between groups based on the multiple dependent measures. The ability of the resultant discriminant function to distinguish between the groups can be tested by a Wilks' lambda, and the classification of individual subjects based on the discriminant function can be evaluated using a chi square statistic.

The four measures (number of blocks, Serial position, Sequential association, and designs completed) at pre, self-evaluation and self-reward post, and retention) were subjected to separate discriminant analyses. At pre and post assessments these four outcome measures did not significantly discriminate between the two groups (Wilks' lambda = .779 and .691, $p = .52$ and .31, respectively). A significant discriminant function (Wilks' lambda = .409, $p = .02$) was found at the retention test indicating that the training and control groups could be differentiated based on their block design performances. Examination of the discriminant function coefficients for each individual dependent measure suggests that the total number of designs completed and correct serial placements were primarily responsible for the differences between the two groups.

Additionally, classification of students based on the derived discriminant functions led to 93.8% correct assignment at retention testing ($\chi^2(1) = 12.25$, $p < .001$), and 75% classification at pre and post assessments ($\chi^2(1) = 4.0$, $p < .05$.

Discussion

The results of the present study suggest that (a) TMR students can learn to evaluate and reward their own performances and (b) these acquired skills can lead to improved performances on a targeted task.

This is, to our knowledge, the first report indicating that retarded students can acquire both self-evaluative and self-reward skills simultaneously. The only other attempts to develop these skills have included single subjects, adult populations, and/or development of very simple self-reward skills. In the present study we first operationalized the self-evaluative component skills (i.e., yellow happy face, green square) and then taught our students to utilize these responses as cues (i.e., happy face served as an S^D for taking a reward, green square served as an S^Δ). Thus self-reward was conditional on a positive self-evaluation (i.e., putting a yellow happy face on the scoreboard.

Unlike the Helland, Paluck, and Klein (1976) study, self-reward was cued internally in our students rather than externally (i.e., a pink sheet of paper).

Analyses of self-evaluative and self-reward did result in significant training effects. That is, the training group either significantly outperformed the control group at each assessment or the difference approached significance. This was true for both the training task (symbol matching) and transfer task (block design). These findings are that much more impressive when we realize that detailed instructions on how to self-evaluate and/or self-reward along with two prompted practice trials were provided at each of the assessment periods (pre, post, and retention). Thus the control group received three sets of instructions and six practice trials for each task by the time they performed at the retention period. Even with these experiences the control group continued to perform at a chance level (i.e., 50% correct on self-evaluation and 25% correct self-evaluation and self-reward) until they were exposed to the training program. We should also note that since, by chance, the control group would be expected to correctly self-evaluate on 6 of 12 trials and correctly self-evaluate and self-reward on 3 of 12 trials it would take an even more powerful training effect to have differences reach significance.

Probably the most significant finding in this study was that the training group significantly outperformed the control group on the block design task at retention testing. This is the first instance in which a between group (i.e., treatment vs. control) design has been utilized to evaluate the effects of acquired self-regulatory skills on task performance. The only other reports have been anecdotal (e.g., Mahoney & Mahoney, 1976) or have involved within group (e.g., baseline vs. self-reward) comparisons (see Helland, Paluck, & Klein, 1976).

This result suggests that task performance in a retarded population can be increased if self-evaluative and self-reward skills are devoloped. The fact that differences in task performance occurred only at retention testing and not at posttesting indicates that these skills most likely need to be applied over some period of time before changes in behavior can be observed. That is, once retarded individuals have developed these self-regulatory skills they must be given an opportunity to utilize them for a period of time in order to effect changes in their targeted performances.

In sum, the self-regulatory skills of evaluation and reward can be acquired by TMR students, and more importantly these skills can affect task performance.

Masters and Santrock (1976) recently reported a series of studies designed to investigate the reinforcing or punishing characteristics of evaluative and affective self-statements made by 4-year-old children. They trained the children to self-administer various task-relevant as well as task-irrelevant statements containing differing affective quality and observed the effect of these statements on task persistence. Of particular interest was a study in which the children were told to administer self-evaluations of task performance such as, "I'm really good at this" or "I'm no good at this" while performing a handle-turning task. The results of this study showed that children who verbalized positive self-evaluations persisted longer than either those who administered neutral statements or negative self-evaluations. Those who administered negative self-evaluations did not differ in task persistence from those who administered neutral statements. Thus, in this instance, positive self-evaluations served to maintain or reinforce task performance, while negative self-evaluations seemed to have little effect.

Interestingly, these same authors also found that task-irrelevant verbalizations associated with positive or negative affect also seemed to exercise the same systematic control over task persistence as the various evaluative statements employed. Thus, they propose that evaluative statements may function to control behavior via the affect associated with those evaluations rather than the content of the evaluations per se. Masters and Santrock (1976) generated further support for this contention by finding that children who evaluated the task as fun persisted longer than those who did not evaluate the task as fun. The results of the previous study (Acquisition of Self-Evaluation and Self-Reward Skills and Their Effects on Performance) suggested that task performance was affected by appropriate self-evaluations and rewards. The present study was conducted with the aim of isolating the self-evaluative component and determining its effects on the behavior of TMR students.

Method

Subjects

Thirty students from the Fairhaven TMR Training Centers in San Diego, California, served as subjects for this experiment. Each of the two experimental groups as well as the control group contained six individuals from the Mission Beach Fairhaven facility, which serves TMRs from ages 16 to 21, and four individuals from the McCandless Fairhaven site, which serves students from ages 10 to 15. Each of the experimental groups contained six males and four females, while the control group included seven males and three females.

Each student was administered the Slosson Intelligence Test (Slosson, 1963) prior to participation in the study. Based on the results of this test, students were assigned to one of the three groups using a stratified matching of means and standard deviations of chronological age (CA) and intelligence quotient (IQ). The results of this matching procedure are presented in Table 1.

Prior to formal data collection, criteria of 80% correct timing of self-administration of self-statements and 80% correct verbalization of self-statements during testing were established as requirements for subject inclusion in the groups. It should be noted that five subjects in the positive self-evaluation

group and one subject in the negative self-evaluation and control groups were excluded from the present study for failure to meet these criteria.

Table 1

Group IQ and CA Data

Group	IQ M	IQ S.D.	CA M (Months)	CA S.D. (Months)
Positive self-evaluation	45.1	7.75	199.4	45.10
Negative self-evaluation	47.5	9.82	195.5	50.15
Control	47.5	12.95	201.6	46.63

Task

In order to assess the effects of the experimental manipulation, a task was designed which would have minimal intrinsic reward. A handle-turning task was devised in which each individual was required simply to turn the handle on an 18" x 18" x 9" wooden box. Each turn of the handle activated a step relay, so that after each 10 turns a bell located inside the box was rung. This served as the signal for the subject to verbalize the appropriate self-statement. A counter located on the back of the box and hidden from view of the subject kept a cumulative record of the number of handle-turns. As in the study conducted by Masters and Santrock (1976), this number represented the persistence score for each student.

Procedure

Each student was brought individually to the experimental room. The experimenter then explained that he had some work for the individual to do, but before this work could be begun, it was necessary that the subject could repeat a certain phrase. The experimenter then spoke the appropriate phrase and asked the subject to repeat it. Individuals in the positive self-evaluation group were asked to verbalize the phrase, "I'm really good at this!" This phrase was modeled with positive affect by the experimenter in an attempt to reflect enthusiasm and pride. Individuals in the negative self-evaluation condition were asked to repeat the statement, "I'm not very good at this." The experimenter attempted to model this phrase with negative affect to connote self-criticism and disappointment. "One-two; one-two." This phrase was modeled by the experimenter with neutral affect. The use of this neutral statement was intended to control for the potentially interfering or competing qualities of repeating the experimental statements. The affective intonations of the modeled statements, of course, reflect the judgments of the experimenter and no attempt was made to validate the affective quality of these self-evaluations.

The experimenter modeled the appropriate evaluative/affective statement until the subject was able to repeat the phrase correctly on three consecutive attempts. A correct self-statement consisted only of an accurate repetition of the words in the phrase. Due to the qualitative nature of the affective content of the statement, it was not required that the subject imitate the affective characteristics

of the statement as delivered by the experimenter.

After it was determined that the subject could verbalize the descriptive content of the self-statement, the experimental task was introduced. The experimenter explained that he had some work for the student to do and that he would demonstrate how to do the work. The experimenter then modeled three consecutive trials by turning the handle at an even rate and repeating the appropriate self-evaluative statement each time the bell rang. Again, an attempt was made by the experimenter to verbalize the statements with congruent affect.

After the three demonstration trials, the experimenter said, "Now it's your turn to do just what I did." The subject was then allowed to perform the experimental task. Prompts and corrections were given by the experimenter in those instances where the subject failed to verbalize the self-statement correctly, when the self-statement was verbalized at any time other than when the bell sounded, when the subject continued to turn the handle without repeating the self-statement after the bell had rung, or when any competing statements were verbalized during the trials. Training via prompts and corrections continued until each subject had correctly repeated the self-statement on eight consecutive trials without prompting or correcting. Again, it was not required tha the subject imitate the affective quality of the self-statements.

The experimenter then explained that he was going to sit down at a table in another area of the room and do some work. He further explained that the subject was to work at the task just as before for as long as the student desired. In order to minimize demand characteristics possibly associated with these instructions, the experimenter added that, "some people work for a long time and others for just a little bit." He explicitly indicated that he did not care how long the subject worked, but rather wanted the individual to work as long as desired. The subject was instructed to join the experimenter at his table whenever the student wished to stop working. After the subject appeared to understand these instructions, the experimenter moved to a table located approximately 20 feet away and at an angle somewhat behind the subject so that while the subject was performing the task, the student was not facing the experimenter.

As the experimenter sat down, he started a stopwatch to record the amount of time the student worked at the task. The experimenter also recorded whether or not the appropriate self-statement was verbalized at the proper time and whether the statement appeared to be spoken with the proper affect. If the subject stopped the task for at least 15 seconds, the experimenter prompted the student by saying, "Remember, keep working or come sit down." Because the subjects often turned their heads to observe the experimenter while performing the task, the experimenter was careful not to observe the subject. This was done to emphasize the independent nature of the subject's performance and minimize possible demand characteristics associated with the experimenter's presence.

After the individual had voluntarily terminated the task or worked for a maximum of 30 minutes, an evaluation of the task was obtained from each subject. For this purpose, three cards were placed in front of the subject. The cards were arranged in random order with one card showing a "happy" face with an upturned smile, one card showing a face with a neutral horizontal line for a mouth, and another card showing a face with a "sad" downturned mouth. Each subject was then asked, "If you had to tell your friends about the work you just did, which one of

these faces would you look like? The responses were scored +1, 0, or -1 for selection of a "happy" face, neutral face, or "sad" face, respectively.

Following the task evaluation, the experimenter placed a bowl containing 500 pennies and an empty bowl in front of the subject. It was explained that the experimenter was going to leave the room for 1 minute. The experimenter went on to say that, while he was gone, the subject was to take as many pennies from the bowl as the student deserved for the work that was done and put them into the empty bowl. The experimenter was careful to point to the handle-turning task when delivering these instructions in order to promote the contingent nature of the reinforcement. After the subject seemed to understand these instructions, the experimenter left the room. It was hoped that any demand characteristics associated with the presence of the experimenter would be reduced by the removal of the experimenter from the room, thereby allowing the subject unrestricted access to the bowl of pennies.

After 1 minute, the experimenter returned to the room and counted the pennies taken by the subject. The number of pennies transferred to the empty bowl constituted the measure of self-reward.

Each subject was then allowed to exchange the pennies that were taken for a prize (toys, books, records, etc.) from a group of prizes available.

In order to reduce any possible negative effects associated with the repetition of the negative self-evaluative statement, subjects in this condition received the following debriefing before they exchanged their pennies for a prize:

> Although I told you to say that you were not very good at the work, I want you to know that you <u>really</u> did a good job. You did just as well as everybody else. In fact, you did such a good job that I'm going to let you exchange your pennies for a prize.

Each subject was thanked for his or her participation and returned to the classroom.

Results

The three dependent measures of persistence, rate (handle-turns per minute), and amount of self-reward were subjected to a 3 (Conditions: Positive self-evaluation, Negative self-evaluation, Control) X 2 (Gender: Male, Female) analysis of variance. No main effects for condition or gender or interactions of condition and gender were found to be statistically significant for any of these three dependent measures. Planned orthogonal comparisons corresponding to the experimental hypotheses on these three dependent measures also failed to reach statistical significance in constrasting the three experimental conditions.

Task evaluation data were analyzed using a Mann-Whitney U Test corrected for ties (Siegel, 1956). No significant difference was found between the three groups on this measure ($U = 68$, $p > .05$).

Although a causal link could not be established, the data relating to task persistence and task evaluation were examined further to clarify any possible connection between these two measures. It was found that individuals who evaluated the task positively did not differ in task persistence from those individuals who evaluated the task negatively, $t(28) = .91$, $p > .05$.

Since this study was also concerned with the possible role of affect in self-reward, the data on task evaluation and self-reward were also examined further to evaluate any possible associations. No difference in amount of self-reward was found between those subjects who expressed enjoyment with the task and those who did not, $t(28) = .33$, $p > .05$.

As previously mentioned, the experimenter also recorded his subjective impressions of the affect accompanying each self-evaluative statement. These observational findings indicated that only 36% of the positive and negative self-evaluations appeared to be intoned with the desired affect.

Discussion

This study failed to demonstrate that TMRs can use self-evaluative statements to facilitate or to inhibit task performance using dependent measures of task persistence and rate. Additionally, there was no suggestion that self-evaluative statements generate any particular affective response for TMRs or that the self-evaluations or affective responses promote or inhibit self-reward. Finally, there was no indication that task enjoyment was related to task persistence. Several possible explanations can be proposed for the lack of significant findings.

In general, more encouraging results may have been found had the present experiment been extended over a longer period of time, allowing each individual to perform different tasks under differing self-evaluative situations over several days.

It is also possible that the contingent relationship between the self-evaluative statements and task performance may not have been strong enough or adequately established. It appears that the relative absence of appropriate affect associated with the self-evaluative statements may offer the best explanation for the lack of significant findings in this study. Since it can be assumed that there is a large affective component associated with task evaluation, the lack of significant differences among the groups on this measure suggests that there was little affect distinctly associated with the self-evaluative statements. Similarly, since it has been shown in studies employing an affect induction procedure that self-reinforcement is related to the individuals' affective state (Underwood, Moore, & Rosenhan, 1973), the lack of significant group differences on the measure of self-reinforcement also indirectly suggests the absence of affect associated with the self-evaluations. There was some observational evidence in the present study to suggest that there was little affect generated by the self-evaluations. The experimenter noted that only 36% of the positive or negative self-evaluations seemed to be verbalized with the congruent positive or negative affect. Thus, although the self-evaluative statements were presumably modeled by the experimenter with the appropriate affect, it does not appear that the affective component of the statements was imitated by the TMRs. Most of the evaluative statements appeared to be said with minimal affect. Thus, if the motivational component of self-evaluations is largely moderated by the affect associated with these evaluations as Masters and Santrock (1976) and Rosenhan (1972) suggest, then one would not expect the self-evaluations made by the TMRs in this study to act as reinforcers or punishers.

It is possible that the absence of affect or motivational control associated with self-evaluations may be related to the socialization of the mentally retarded. Because the intellectually handicapped are typically viewed as passive and dependent,

standards and evaluations of performance are often made by others, usually parents or teachers, giving the individual little opportunity to evaluate his or her own behavior. Additionally, evaluations made by others can at times be inconsistent and inappropriate. Thus, it appears likely that the mentally retarded individual typically has little experience with self-evaluation and may have learned little of the process of self-evaluation by observing others. For example, the inexperience of students' use of self-evaluative statements in the present study was reflected by the need to work with many of the students for extended periods of time so that they could verbalize the proper self-evaluative statement. Because of their apparent inexperience in verbalizing self-pride or self-criticism, these students may have associated little meaning with the self-statements. Given these circumstances, it may be necessary first to condition the self-evaluative statements by shaping (Lovaas, 1964), fading (Bem, 1967), or correspondence training (Karoly & Dirks, 1977) so that these statements can acquire motivational value prior to employing the experimental manipulation.

Ability to Delay Gratification

and Causal Attributions

We decided to focus on delay of gratification because self-reinforcement requires conditional self-reward when reinforcers are freely available (see Bandura, 1976). If individuals are to administer these rewards contingent on desired target performance they must be able to forego immediate gratification for some later reward.

Both Kanfer and Mischel (1974) have proposed similar two-stage models of delay of gratification (i.e., self-control). In the first stage, which Kanfer referred to as decisional self-control, a choice is made either to seek larger delayed rewards or to obtain immediately available smaller rewards. If a decision is made to seek larger delayed rewards, then the second stage, protracted self-control, emerges (Kanfer, 1977). That is, the individual must be able to withstand the self-imposed delay interval if the delayed reward is to be obtained. There is some empirical evidence (e.g., Mischel & Metzner, 1962; Morena & Litrownik, 1974) indicating that retarded children do, in fact, lack the ability to delay gratification at the choice stage (i.e., decisional self-control), which is a necessary prerequisite for effective self-regulation.

We have found that moderately retarded students can learn to delay at this choice stage if they are allowed to first experience the delay interval (see Litrownik Franzini, Geller, & Geller, 1977).

Thus, we expected that the ability to withstand the delay interval (i.e., protracted self-control) could also be acquired. In an attempt to develop this skill we first identified TMR students who were nondelayers and then exposed them to both a taped demonstration of and live training in protracted self-control. We also assessed the causal attributions of these students to determine if they attributed their reward obtainment to internal or external sources.

Method

Subjects

Thirty-seven students at Fairhaven School in San Diego who had IQs between 33-56 and MAs between 3 and 7 years were assessed on their ability to delay gratification (i.e., evidence protracted self-control). Those students (19 of 22) who did not delay for at least 3 minutes in the delay situation were assigned to either a training or control group. Three of the non-delaying students were excluded from the study because of physical and/or behavior problems.

Delay Paradigm

Students were brought individually to our mobile laboratory and allowed to select an edible reward that they wanted to work for. After sitting at their work table students were told that they would have an opportunity to earn some of their chosen food. Initially they were instructed to sort a pile of 4 nuts and 4 bolts into two separate containers. The experimenter told the students that they had earned 4 pieces of food and could take them and leave or they could wait while the experimenter ran an errand and could earn 6 pieces when she returned. A clock with

a timer and bell was introduced to the students with the explanation that the experimenter would be back in 10 minutes. The students were told that if they waited for the bell to ring (when the experimenter would return) they could have 6 of their selected reward. On the other hand, they could push a button at their work table which would ring a bell and bring back the experimenter. If they rang this bell and did not wait for the experimenter to come back they only received the 4 pieces of food they had already earned.

Prior to leaving students in this situation the experimenter placed the rewards (4 vs. 6) in a plastic container in front of the child, had the student correctly identify (criterion of 6 consecutive correct) what they would get if they rang the bell or the clock's bell rang, and told the students that there were some more nuts and bolts that could be sorted. The experimenter left the room and waited until the student rang the bell or until 6 minutes had elapsed during pretesting or 15 minutes during posttesting when the clock bell rang. Upon entering the room the experimenter asked the student to identify the reward s/he would get, and then asked the student to indicate why s/he got that reward; because (a) you did good work, (b) I like you, or (c) it (point to food) tastes good. This last forced choice question constituted our assessment of causal attribution.

Procedure

Following the pretest the 8 nondelayers in the training group were exposed to a 15 minute videotape in which Kiwi the clown was shown in the same delay paradigm. In the tape Kiwi delayed until the clock rang, during the delay interval he worked at sorting the nuts and bolts, and while he worked he praised himself and attributed his obtaining the larger reward to his own effort and ability (i.e., internal sources).

Immediately after observing Kiwi the training subjects were again exposed to the delay assessment. Control students were posttested without any prior taped demonstration.

Since we found that this taped exposure did not affect delay performances we developed a live training program and presented it to the training students. This training was spread over a 2-day period (30 minutes the first day and 15 the second) and included 8 steps. Students moved from one step to the next if they passed at the specific step (e.g., pass Step 1 move to Step 2). On the other hand, if they had two consecutive misses at a step they returned to the previous step or to an intermediate step.

At Step 1 the experimenter set the clock for 30 seconds and instructed the student to begin sorting different sized nails. In addition the students were told that if they waited for the clock to ring they would earn 1 reward but if they rang the bell themselves they would not get anything. During the 30 second delay interval the experimenter provided the students with positive feedback one time (e.g., "good work! You're doing a good job.").

When students were able to wait and work during this 30 second interval they then progressed to Step 2. This time the dealy interval was 60 seconds. Everything else (e.g., Experimenter stayed in the room, etc.) was the same as in Step 1 with the exception that the students were praised three times during the delay interval.

Step 3 was similar to the two prior steps with the delay interval being 2 minutes and praise during the delay interval being administered only twice.

At Step 4 we attempted to remove the experimenter from the room. The rewards were the same as in the prior steps, 1 for waiting and none for not waiting. This time the interval was 30 seconds and the experimenter left the room. If students were able to delay they moved on to Step 5, if not they were exposed to 2 intermediate Steps (3a & 3b). The experimenter stood in the doorway at Step 3a and left the room at Step 3b but the delay interval was only 15 seconds. When students delayed at these steps they moved on to Step 4 again.

Steps 5 and 6 were the same as Step 4 (i.e., 0 or 1 reward, experimenter outside the room) but required waiting for 1 and 2 minutes respectively. Step 7 included a 2 minute delay with the rewards being 1 for not waiting and 3 for waiting. On the final step (Step 8) students received 2 rewards for not waiting and 4 for delaying the entire 3 minutes.

Following passage of Step 8 on the second training day or a maximum of 15 minutes, training students were again exposed to the delay paradigm.

Results & Discussion

At each delay assessment (pre, post film, post live training) the amount of time that students delayed, how much work they completed, and their attributions were recorded. The length of time students delayed at pretesting varied from 2 to 180 seconds (note: 15 students delayed the entire interval of 6 minutes) while none sorted any nuts or bolts nor attributed their reward obtainment to themselves.

Following exposure to the tape of our clown model, students in the training group did not increase their delay time (range = 1-17 seconds). On the other hand, two students in the control group delayed the entire 15 minute interval and two others delayed for a minute. We did find that the three students in the training group sorted some nuts and bolts (very briefly) while none of the control students did any sorting.

All but one of the training group students passed each of the 8 live training steps before the second post delay assessment. Following this training 3 of the 8 training students delayed for the entire 15 minutes interval, and one delayed for 1 minute. These four students did sort the nuts and bolts during this time. Control students, again, did not complete any work (i.e., sorting). Three of the 11 students did delay the entire 15 minutes though.

Thus, the results indicate that our attempts to develop protracted self-control in TMR students via taped and live training were not effective. The only thing we appeared to influence was whether students worked at the task during the delay intervals.

When we examined the training students who did not delay after live training we noticed that they exhibited a variety of behavior problems (e.g., inattentiveness). We attempted to work with these individuals for a longer period of time, training them to sort and attend to the task. Even with this additional work these students did not evidence any propensity to delay. In fact, we found that

they would not sit and attend to the task for more than a couple of minutes at a time.

We conducted pilot work which suggested that the ratio used, 6:4 would lead to more nondelayers. Based on the results of this study it appears that students who were identified as nondelayers in this specific situation did not possess basic skills necessary to maintain performance on a task for any length of time. It is clear that not all TMR students can be classified as unable to evidence protracted self-control. Even in this stringent delay paradigm 41% of the students assessed did delay for the maximum interval. We've reported that in a decisional self-control paradigm a similar percentage of TMRs in a sheltered workshop did chose the delay alternative (see Franzini, Litrownik, & Magy, 1978). Thus, it appears that not all TMR students fail to evidence self-control. Additionally, we found that students in all cases attributed the acquisition of the rewards to them "liking the reward" or the "experimenter liking them." Based on these responses we would conclude that our nondelaying TMR students were outer directed.

Reactivity and accuracy of self-monitoring as a function of the valence of what is monitored

One valued goal of socialization is the development of self-regulatory skills which allow an individual to function independently (see Kanfer, in press). In some populations, such as the intellectually retarded, these skills typically fail to develop (Robinson & Robinson, 1976). A number of preliminary reports (e.g., Helland, Paluck, & Klein, 1976; Mahoney & Mahoney, 1976; Nelson, Lipinski, & Black, 1976) indicate that retarded persons can acquire some self-regulatory skills (e.g., self-observation, and self-reward) and that these skills may lead to increases in appropriate target behaviors.

Self-monitoring has been identified as the crucial first step in the development of self-regulatory skills (see Thoresen & Mahoney, 1974). Self-monitoring can be utilized not only as one method of data collection, but is also viewed as a prerequisite for other self-reinforcement component skills (e.g., self-evaluation, criterion setting, and self-reward). Additionally, there is some evidence (see Hayes & Cavior, 1977; Kanfer, 1977; Nelson, Rudin-Hay, Hay, & Carstens, 1977) that self-monitoring may lead to changes in the target behavior that is being observed.

Self-monitoring involves (a) the observation of covert and/or overt events (including those that are directly a function of the observer's behavior), (b) a discrimination based on these events which signals the occurrence of (c) the self-monitoring response. Previous reports indicate that retarded persons can acquire self-monitoring skills that require both simple (e.g., Kurtz & Neisworth, 1976; Nelson, Lipinski, & Black, 1976) and more complex discriminations (e.g., Litrownik, Freitas, & Franzini, 1978). In addition, Nelson, Lipinski, and Black (1976) report that their mildly retarded institutionalized adult population evidenced changes in the behaviors that they monitored. As we have suggested (see Litrownik, Freitas, & Franzini, 1978) additional research identifying variables that affect both the accuracy and reactivity of self-monitoring in retarded persons needs to be conducted.

Many researchers (e.g., Hayes & Cavior, 1977; Greiner & Karoly, 1976; Kanfer, 1977, Kazdin, 1974; Nelson, Rudin-Hay, Hay, & Carstens, 1977) claim that both the accuracy and reactivity of self-monitoring are a function of the valence of the monitored response. Monitoring of negatively valenced responses is believed to result in a negative self-evaluation which is avoided by not accurately monitoring the response (see Kanfer, 1977). Though the existing evidence is inconclusive (see Thoresen & Mahoney, 1974) there is some suggestion that the monitoring of positively valenced responses leads to an increase in these responses while negatively valenced behaviors decrease as a result of self-monitoring (see Hayes & Cavior, 1977; Kanfer, 1977; Nelson, Lipinski, & Black, 1976; Hayes & Cavior, 1976). This factor (valence of the monitored response) would seem to be most relevant in a retarded population as they typically expect to fail (see MacMillian, 1975) and as a result do not appropriately deal with failure experiences (see Zigler, 1973).

In an attempt to examine the effects of valence on the accuracy and reactivity of self-monitoring in a retarded population, moderately retarded adolescents strung as many beads as they could within a limited amount of time and either did not self-monitor or recorded positive, negative, or neutral outcomes of their performance.

Method

Subjects

Sixty-five students between the ages of 15 and 21 who attend Mission Beach Fairhaven Training Center in San Diego, California, were individually administered the Slosson Intelligence Test (Slosson, 1963). Those students with mental ages between 4 and 8 years and IQs between 20 and 55 were then assessed and trained, if necessary, on three discriminations (red vs. blue, large vs. small, and work that was finished vs. not finished) necessary for participation in the study. Students with severe visual, motor, or behavioral problems and those who did not acquire these discrimination following 30 minutes of training were excluded from the study. From the remaining pool of 45 students four groups of 10 subjects (5 male and 5 female) each, were delineated based on a stratified match of means and variances for the variables of IQ, MA, and CA (see Table 1). One group was then randomly assigned to (a) monitor each time they finished stringing a tray of beads, (b) monitor each time they did not finish a tray, (c) monitor when they had strung red beads, and (d) string beads without any self-monitoring.

Table 1

Means and Standard Deviations for IQ, MA, and CA across Experimental Groups

	IQ		MA/years		CA/years	
Group	M	SD	M	SD	M	SD
Success	39.1	7.2	6.3	1.1	18.6	1.7
Failure	39.2	7.4	6.3	1.2	18.2	1.3
Neutral	39.5	7.6	6.3	1.2	18.3	1.5
Control	39.0	8.0	6.2	1.3	18.5	1.6

Task and apparatus

The study was conducted in a converted motor home equipped with three work cubicles each containing a self-regulation apparatus (a diagram of the apparatus is presented along with the training package). Included in each apparatus was a glass tube that held a maximum of 20 marbles which were used for self-monitoring, and a red light that signaled the end of a trial. Each student selected a particular ceramic and colored wood bead to make a necklace. The number or type of bead strung before the red light signaled the end of a trial was monitored. The effects of what was self-monitored on the accuracy of self-monitoring, speed of bead stringing, and persistence at bead stringing were examined.

Procedure

Subjects were brought to the workstations for a maximum of 60 minutes per day over a total of 5 to 7 days. An observer and female experimenter were present during all sessions and recorded self-monitoring responses, the number of training trials required for each subject, the number of task persistence trials, and the number of beads strung during the pre and postassessments. At the end

of each session students were given 10 tokens for their participation that day. Tokens could be traded in immediately for small prizes such as haircombs and jacks, or saved for more expensive items such as records and frisbees.

Phase 1: Pretest performance. Each student's initial bead strining speed was assessed one to two weeks prior to phase 2 (training or yoked experience). Five trials of 25 beads each were presented and the number of beads strung in 125 seconds for each trial was recorded. Three students were assessed at one time, each being signaled to stop stringing beads when the red light went on after 125 seconds.

Phase 2: Self-monitoring large. Subjects in the three self-monitoring groups (finish, not finish, and red) were given instructions to place a marble in the tube each time they had been stringing large beads. The female experimenter provided two students at a time (one male and one female) with six live demonstrations of this self-monitoring task. Twelve bead stringing trials (5 beads/trial) followed these demonstrations. All the beads were tan in color. On half the trials large beads were strung and on half the trial the subject was allowed to finish the tray of five beads before the red light stopped the trial. The number of beads strung by each subject on a given trial was always the same. This was controlled by the experimenter who could illuminate the red light following the completion of the entire tray (5 beads) or fewer. If the student correctly monitored by putting a marble in the tube only when large beads had been strung and not putting a marble in when small beads had been strung on at least 10 of the 12 trials then s/he moved on the third phase of the study. If, on the other hand, this criterion was not reached the subject was taught to observe and follow a large bead trial (cue) with the self-monitoring response (put a marble in the tube).

This training initially began with a series of three demonstrations by the experimenter-model of how to correctly self-monitor following a large bead trial or not monitoring following a small bead trial. As the model demonstrated she verbally described how she observed her performance, what kind of beads she was stringing, the discriminative stimulus (i.e., large beads), and the self-monitoring response that followed or did not. The subject was then instructed to match the model's performance on the same three trials. If successful on all three demonstrated trials twice in a row the student moved to the next step, rehearsal. If at least one error was made on four consecutive demonstrated block of trials the model provided distributed or single trial demonstrations (see Litrownik, Franzini, & Turner, 1976) until six consecutive correct self-monitoring trials had been performed. Once this criterion had been reached the subject moved on to the massed demonstrations step again with the same criteria in force for moving on to the rehearsal step or back again to the distributed demonstrations. Training continued until each student reached criterion during rehearsal (10 of 12 trials correct) where no demonstrations were provided. Thus, all subjects were performing at the same level (10 out of 12 or better) on this differential self-monitoring task (S+ = large and S- = small).

No instructions or demonstrations for self-monitoring were provided nor were marbles available to the control group. Instructions to string beads until the red light came on and bead stringing demonstrations by the model were given and each control student strung beads for 12 trials (half large, half finished). In order to equate bead stringing experience during training, each yoked control

subject was yoked to three partners one from each self-monitoring group, based on gender, IQ, MA, and CA. If at least two of the three partners received training during a particular step, the yoked control subject received the average number of their training trials in additional bead stringing practice (and demonstrations). Six control subjects received this extra experience while five to six subjects in each of the self-monitoring groups required this extra training.

Phase 3: Self-monitoring transfer. In order to insure that the self-monitoring skills acquired during phase 2 had been retained five trials were presented with 4 our of 5 correct self-monitoring trials required before progressing to the transfer assessment. If a subject did not meet this criterion a brief review including instructions and two demonstrations were provided. If the student then correctly self-monitored on 4 of 5 trials within a 10 minute period s/he proceeded to the transfer assessment. On the other hand, formal training of the self-monitoring skill (see phase 2) was resumed if the subject did not meet this criterion within 10 minutes and the transfer assessment took place on another day. This same procedure was followed prior to subsequent assessments during phases 4 and 5.

For the transfer task different cues were to signal the self-monitoring response. Each of the three self-monitoring groups was provided with instructions and two demonstrations of correct self-monitoring (i,e., when they finished, when they did not finish, and when they had strung red beads). Half of the 12 transfer trials required a self-monitoring response while the other half did not. Red and blue beads were randomized over the 12 trials as was the finishing of the tray. All groups were required to monitor on the same trial. That is, the finished group was allowed to finish on the same trial (e.g., 1, 4, 5, etc.) that the not finished group did not finish, and the red group strung red beads. One male and one female from the same monitoring group were assessed simultaneously. If a subject monitored correctly on at least 10 of 12 trials that student moved on to Phase 4. Training of the self-monitoring skills (finish, not finish, and red) for students who did not reach criterion followed the same format (e.g., massed and distributed demonstrations, rehearsal) as described in Phase 2. Once again, at the conclusion of this phase all subjects were self-monitoring at the same level (at least 10 of 12 correct trials).

Control subjects strung beads on a minimum of 17 trials (corresponding to the 5 trial retention and 12 trial transfer assessments). In addition, if two of three yoked partners received training following either the retention or transfer assessments, the control subject strung beads on the average number of trials that their partners had. Six control subjects had this additional experience 7 from the not finish, 6 from the finish, and 2 from the red groups required training.

Phase 4: Task persistence. Following assessment of self-monitoring skills acquired during Phase 3 and additional training, if necessary, persistence at bead stringing was examined. During this phase students (one at a time) were instructed to continue keeping track each time they finished, did not finish, or strung red beads. After one trial, a finish one, subjects were asked to indicate whether or not they wished to continue stringing beads. They were told that they could discontinue the task and go back to their class if they pointed an arrow at a picture of a door. On the other hand, if they wanted to continue stringing

beads they were to point this same arrow at three beads that were next to the picture of the door. To insure that each subject understood this, the experimenter asked the student to show her "what you do if you want to string more beads" or "what you do if you want to go back to your class." Following assurance that the student understood the task a maximum of 34 bead stringing trials was presented with the student choosing to stay and string beads after each trial or deciding to return to the classroom.

Phase 5: Posttest. After insuring that each monitoring group was self-monitoring correctly, a 10 trial (10 beads/trial) posttest was presented. Each student was given 45 seconds to work on each tray of 10 beads. The number of beads strung and the subsequent accuracy of self-monitoring was recorded.

Results

A chi square analysis of the number of students in the three self-monitoring groups who reached criterion on Phase 2 (self-monitor large) following the six demonstrations indicated that there were no initial differences in each groups' ability to acquire differential self-monitoring skills. Similarly, no differences in the number of additional training trials required to learn this skill were evidenced. Hence, the three monitoring groups were equivalent not only in terms of IQ, MA, and CA, but also with respect to initial self-monitoring skills and ability to acquire such skills.

Accuracy

Accuracy of self-monitoring was evaluated during Phases 3 (transfer), 4 (task persistence), and 5 (posttest performance).

First, the number of students in each self-monitoring group who reached criterion on the transfer assessment was compared via a 2 X 3 chi square analysis which approached significance ($\chi^2(2) = 5.60$, $p < .10$). Students in the group that transferred from large to red as the cue for self-monitoring tended to be more likely to reach criterion (8 of 10 students) than the groups that transferred from large to finish (3 of 10) or not finish (2 of 10).

Though students in the not finish group required more training trials ($\underline{M} = 27.43$) than the students in the finish group ($\underline{M} = 22.5$) as would be predicted, this difference was not significant. Examination of self-monitoring accuracy during task persistence and posttest performances similarly indicate that there were no differences. The accuracy for all groups was extremely high, ranging from 98% to 100% correct self-monitoring on each trial during task persistence and from 94% to 100% during the posttest.

Reactive effects

An examination of Table 2 suggests that there were no differences between the four treatment groups on how long they persisted (maximum of 34 trials) at the bead stringing task. It should be noted that for all groups the number of trials that they chose to perform tended to cluster around the maximum (34) and minimum (0) number possible (28 of the 40 students). Additionally, those students who did initially choose to string beads but did not persist for all 34 trials all decided to stop within 13 trials. None of the 40 students persisted on more than 14 trials but less than the maximum of 34.

Table 2

Task Persistence: Number of Subjects Performing 0, 1-13, or 34 Trials

	Number of Trials		
Group	0	1-13	34
Success	4	2	4
Failure	4	2	4
Neutral	3	4	3
Control	1	4	4

Pre and posttest bead stringing performances for each student were calculated in terms of the proportion of beads strung. For the pretest there were a total of 125 beads that could be strung (5 trials of 25 beads each) while 100 were possible on the posttest (10 trials of 10 beads each). An arcsin transformation, recommended by Winer (1971) when proportions are to be analyzed, was performed on each score prior to further analyses.

In order to obtain information which would help to answer the major questions raised, the following set of orthogonal planned comparisons was selected to evaluate bead stringing performance: (a) finish vs. not finish, (b) red vs. control, and (c) finish and red vs. not finish and control. Initial analysis of the transformed pretest scores showed that none of the three comparisons approached significance ($p > .25$). Analyses of post minus pretest performances revealed significant differences for the first and third planned comparison ($\underline{t}(18) = 2.93$, $\underline{p} < .01$ and $\underline{t}(24) = 2.36$, $\underline{p} < .05$ respectively). Specifically, the finish group outperformed ($\underline{M} = .42$) the not finish group ($\underline{M} = .06$), the red group ($\underline{M} = .43$) did not differ from the control group ($\underline{M} = .17$), and the finish and red groups outperformed the not finish and control groups.

Examination of pre and posttest performances (see Figure 1) reveal that all groups improved on the posttest relative to their pretest performances. Of interst is the observation that the not finish monitoring group did not improve as much as the group that did not monitor while the finish and red monitoring groups improved more than this control group.

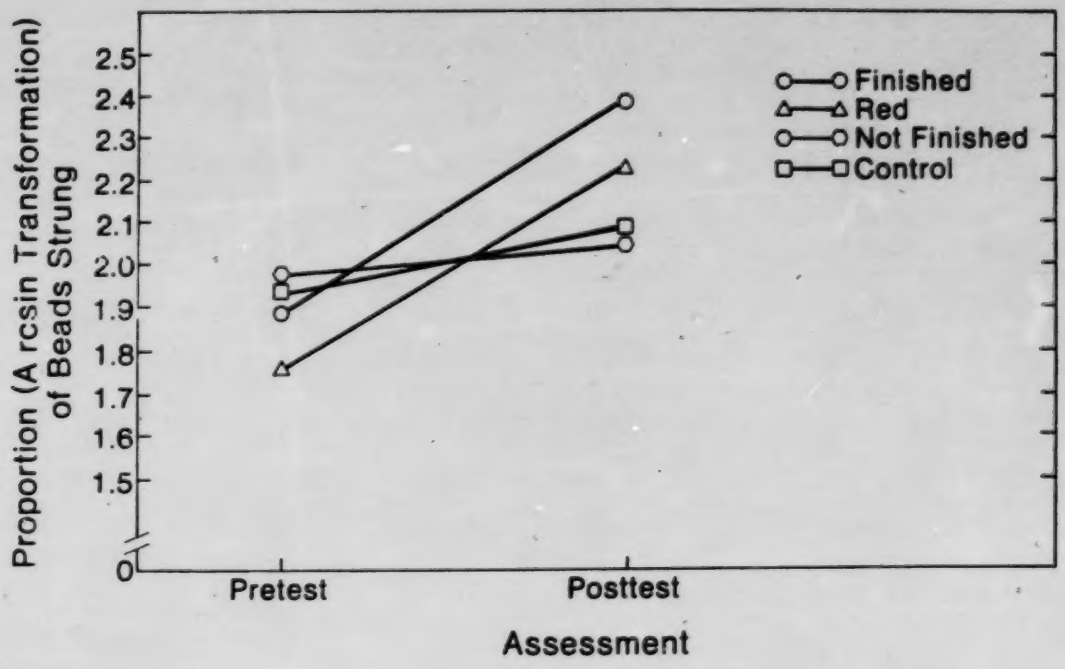
Discussion

The results can be summarized as follows: (a) No differences in the acquisition of positive or negative self-monitoring occurred. (b) Both the positive and negative self-monitoring groups accurately monitored at a high rate on subsequent trials. (c) Persistence at a bead stringing task was not differentially effected by the monitoring of positive, negative or neutral outcomes. And (d) bead stringing performances of the group monitoring a positive outcome (i.e., finish) surpassed those of the group monitoring a negative outcome (i.e., not finish).

The failure to find differences in the acquisition of self-monitored negative and positive valenced outcomes and in the accuracy of self-monitoring of positive

Figure 1

Mean pre- and posttest proportion (arcsin transformation) of beads strung for the self-monitoring and control groups.



and negative outcomes once acquired may be a function of the specific population examined. That is, an important determinant of self-monitoring accuracy is whether or not the individual is externally monitored (see Kanfer, 1977). Retarded individuals have been characterized as outer-directed in their problem solving orientation (see Zigler, 1973) and since there were two experimenters present during all phases of the study this external monitoring could have led to the highly accurate performances of all groups which masked any effects of the valence of what was monitored. Though this might explain the failure to confirm the propsed relationship between valence and accuracy, it is consistent with other reports which also claim that trends in the expected direction have been found but no significant differences emerged (see Nelson, Rudin-Hay, Hay, & Carstens, 1977).

The three self-monitoring groups continued to accurately keep track of whether or not they finished or strung red beads during the assessment of how long the students' would persist at the task. Even with accurate monitoring no differences in persistence between the negative and positive self-monitoring groups emerged nor were there any differences between the neutral and control groups. In fact, about one third of the 40 students persisted for the maximum number of trials (34), one-third for the minimum (0), and one-third between 1 and 13 trials. The type of monitoring had no relationship to these three groups. It appears that factors other than the valence of what was monitored determined whether or not a student would first choose to persist when given a choice (i.e., evidence decisional self-control) and then actually continue to perform the task when asked on each subsequent trial whether s/he wanted to continue working (i.e., evidence protracted self-control).

Bead stringing performance (post minus pre rate) was affected by the valence of what was self-monitored. The positive or finish group outperformed the negative or not finish group. This difference appears to be due to the increase in the positive group relative to a no monitoring yoked experience control group and a decrease in the negative group's performance relative to this same control group.

Initially we viewed this result as consistent with the findings and claims of others (e.g., Hayes & Cavior, 1977; Kanfer, 1977; Kazdin, 1974; Nelson, Rudin-Hay, Hay & Carstens, 1977; Thoresen & Mahoney, 1974). That is, monitoring of socially acceptable responses leads to an increase in performance and monitoring of socially unacceptable responses leads to a decrease in the behavior being recorded. But this was not the case. A decrease in unacceptable responses (i.e., not finishing) should result in better performance, (i.e., more finishing).

It does not appear, then, that the relationship between the valence of what is monitored and reactivity is a simple one. Our findings, while apparently at odds with previous claims, is consistent with the results reported by Kirschenbaum and Karoly (1977). They found that a group of college students who monitored correct responses evidenced increases in their performances while a group that monitored incorrect responses showed decreases in their performances. In this study, as in the present study monitoring of the occurrence or nonoccurrence of a desired target (e.g., correct or finish) resulted in an increase in the behavior on the one hand and a decrease on the other.

We would suggest that reactivity is not simply a function of the valence of what is self-monitored but rather by the valence of the target response (e.g.,

correct is positive, finish is positive, smoking is negative) and whether or not the cue for a self-monitoring response is the occurrence (correct, finish, smoking) or nonoccurrence (incorrect, not finish, not smoke) of this target response. Our results suggest maximum benefits of self-monitoring will accrue when the occurrence of a positive outcome is monitored as opposed to its nonoccurrence.

Part II: Developing Self-Regulation and Evaluating Its Effects

Development and Application of a Training Package for Self-Regulation

All of these preliminary studies were conducted with the aim of learning more about each self-regulatory component and how to best go about developing each. In developing our training package we utilized information that was obtained from the results of these studies as well as from our general experience.

One of the most important contributions that these prior studies made was to help us to identify entering behaviors that would be necessary for the successful application of a training program. That is, in the preliminary studies we found that some of the children did not acquire a given self-regulatory component skill when provided with a time-limited training program. When we identified those children who had not benefited from training and compared them to those who did we noticed that the groups differed. The children who acquired the skills all were able to sit and attend to a model for a minimum of 10-15 minutes. They also possessed certain concepts or were able to make certain discriminations. They could discriminate between numbers, colors, when they finished a task, etc. Based on these observations we were able to identify certain necessary prerequisite skills or entering behavior.

In addition to identifying these requisite skills, our previous research had demonstrated the effectiveness of taped modeling demonstrations. It was evident, much time could be saved if students could be taught the various self-regulatory skills via taped demonstrations. Therefore, in our training package we attempted to develop component skills by first providing our retarded students with a tape demonstrating the appropriate skill. Their performance of the specific self-regulatory skill that had been demonstrated was then assessed and only if they did not demonstrate mastery did we provide more detailed live demonstration training.

The advantages of this procedure are twofold: First, those students who can learn via taped demonstrations are not required to go through a long unnecessary training program. Instead, the program is criterion-based and only takes as long as is required to bring each individual to a specific level of performance. The second advantage is that retarded students can be trained in groups. In practice there is probably no limit, within reason of course, to how many retarded students can be trained via taped demonstrations. We did have certain space limitations in our Mobile laboratory which allowed us to only train two or three students at a time. It should be mentioned that based on our success there is good reason to believe that much larger groups could be trained with equal success.

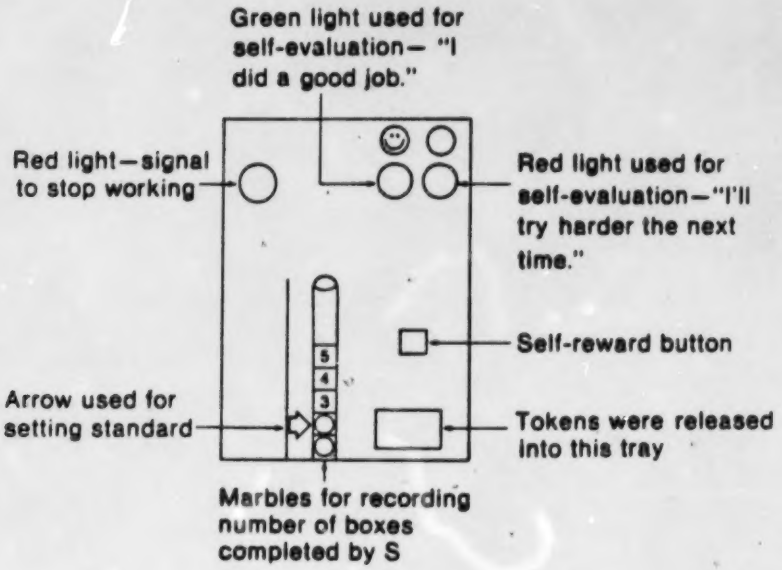
A third and most important component of our training package is that it is criterion-based. As mentioned previously, training initially involves brief taped demonstrations. If a student acquires the skill as evidenced by actual performance then training in the next component begins. On the other hand, if additioral training is necessary this training continues through a series of steps with criteria at each step. By breaking the skills down into smaller steps and requiring mastery before moving from one step to the next we anticipated that every student who possessed the requisite entering behaviors could be taught all of the necessary self-regulatory component skills.

Additionally, we needed to develop an apparatus that would (1) allow us to directly observe students' performances of each component skill (2) facilitate the training of each component skill, and (3) be adaptable to a number of situations

or tasks that students might be exposed to in their classrooms. The apparatus that we designed and utilized is depicted in the figure below. Its dimensions are 21" x 15" x 11". As shown in the figure, the face (or position facing the student) contained a number of component parts each corresponding to various self-regulatory component skills and available for manipulation by the person seated in front of the apparatus. The plastic tube was used for the self-monitoring component. Marbles could be placed in the tube (maximum of 15) to indicate recordings of how many problems, etc., had been completed, completed correctly, etc. A standard for performance could be set by moving an arrow which was attached to a metal rod adjacent to the plastic tube up or down along the length of the tube. Self-evaluations or comparisons between performance and performance standards were indicated by flipping a switch that would light either a green light and green happy face (positive self-evaluation—meet or beat standard) or a red light (negative self-evaluation—did not meet standard).

Figure 1

APPARATUS USED FOR TRAINING IN SELF-REGULATORY SKILLS


Green light used for self-evaluation— "I did a good job."
Red light—signal to stop working
Red light used for self-evaluation—"I'll try harder the next time."
Self-reward button
5
4
3
Arrow used for setting standard
Tokens were released into this tray
Marbles for recording number of boxes completed by S

Tokens were self-administered by pressing a reward button and collecting dispensed rewards in a tray. We decided to use tokens as reinforcers as they were easily dispensed and could be used by trainees to obtain any number of back-up reinforcers (i.e., reinforcers that are most valued by a given student). The final feature of our apparatus was the red light in the upper left hand corner. It signaled that a trial was over (i.e., students were to stop working and begin monitoring, evaluating, etc., their performance).

We developed this specific apparatus as it allowed us to define, operationally, each of the self-regulatory component skills. In addition, we thought that it could be adapted to a number of tasks, especially those that might be presented in educational setting.

In order to develop our training package we had to select a specific task on which to base our training. That is, we utilized our apparatus and the general approach (i.e., criterion-based, demonstrations, etc.) described previously in developing a self-regulation training package that was specific to a given task.

The Training Package

Task

In some preliminary pilot work we discovered that most of the students at Fairhaven were capable of stringing beads, and that they seemed to enjoy this activity. Thus, for our training and assessments we used a bead stringing task. In order to maintain interest in this activity we allowed the students to keep two of the necklaces that they made in addition to collecting tokens that could be used to purchase items from our store either at the conclusion of a session or at some later time (i.e., "saved" for larger more desirable items). We included a wide range of goodies to insure customer satisfaction! In addition, we asked students prior to their participation in the training program to tell us what they would like to have available. We found that records, coloring books, toy cars, combs, and rings were among the most popular items. On each trial 5 trays of 5 beads each were presented to the student who was told to string the beads until the red light went on. Our aim was to teach TMR students to regulate their performances on this task. For example, if a standard of 3 was set (i.e., finish 3 trays) and 2 trays were completed, then a marble for each completed tray was to be dropped into the tube (i.e., 2). Since the standard of 3 was not reached the red light indicating that the student had to "try harder next time" was turned on, and no token was self-administered. On the other hand, if the standard was 3 and all 5 trays were completed, then 5 marbles were put in the tube, one for each tray completed, the green light was turned on ("I did a good job") and a token was self-administered.

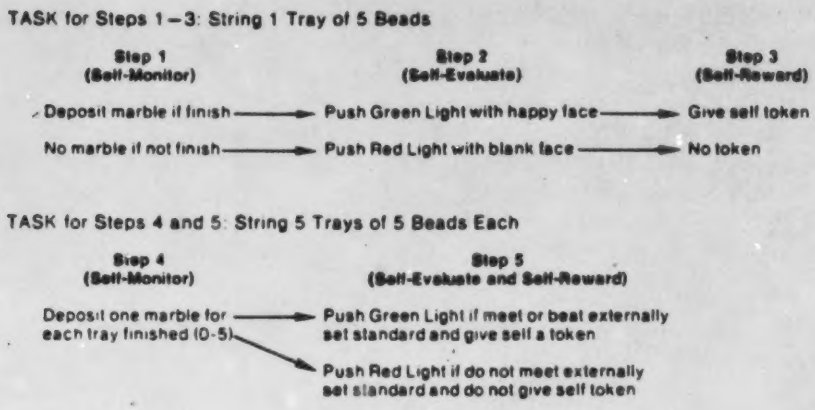
Training

Our goal was one of bringing each training student to the point where he or she could perform each of these components. In order to do this we broke down the task into 5 steps shown in the following table. At Step 1 each trial consisted of a single tray of 5 beads. Students were taught to put a marble in the tube only when they finished the single tray of beads before the red light went on.

The self-evaluation component was added at Step 2. If a training student finished a tray of beads then the green light with the happy face was to be turned on. The red light was to be turned on when the tray was not finished.

Table 1

SELF-REGULATORY SKILLS: TRAINING STEPS


TASK for Steps 1–3: String 1 Tray of 5 Beads
Step 1 (Self-Monitor)
Step 2 (Self-Evaluate)
Step 3 (Self-Reward)
Deposit marble if finish
Push Green Light with happy face
Give self token
No marble if not finish
Push Red Light with blank face
No token
TASK for Steps 4 and 5: String 5 Trays of 5 Beads Each
Step 4 (Self-Monitor)
Step 5 (Self-Evaluate and Self-Reward)
Deposit one marble for each tray finished (0-5)
Push Green Light if meet or beat externally set standard and give self a token
Push Red Light if do not meet externally set standard and do not give self token

In Step 3 the self-reward component was added to the single tray trial. If a tray was finished and the green light turned on, then the student was taught to press the self-reward button and obtain a token. A not finished trial with a red light indicating that the student had to try harder next time was not followed with the pressing of the self-reward button.

At Steps 4 and 5 we presented students with 5 trays of 5 beads each. Students were taught to drop in one marble for each tray completed during Step 4. At Step 5, the students were taught to evaluate their performance, after a standard had been set for them, and to administer rewards contingent on this evaluation.

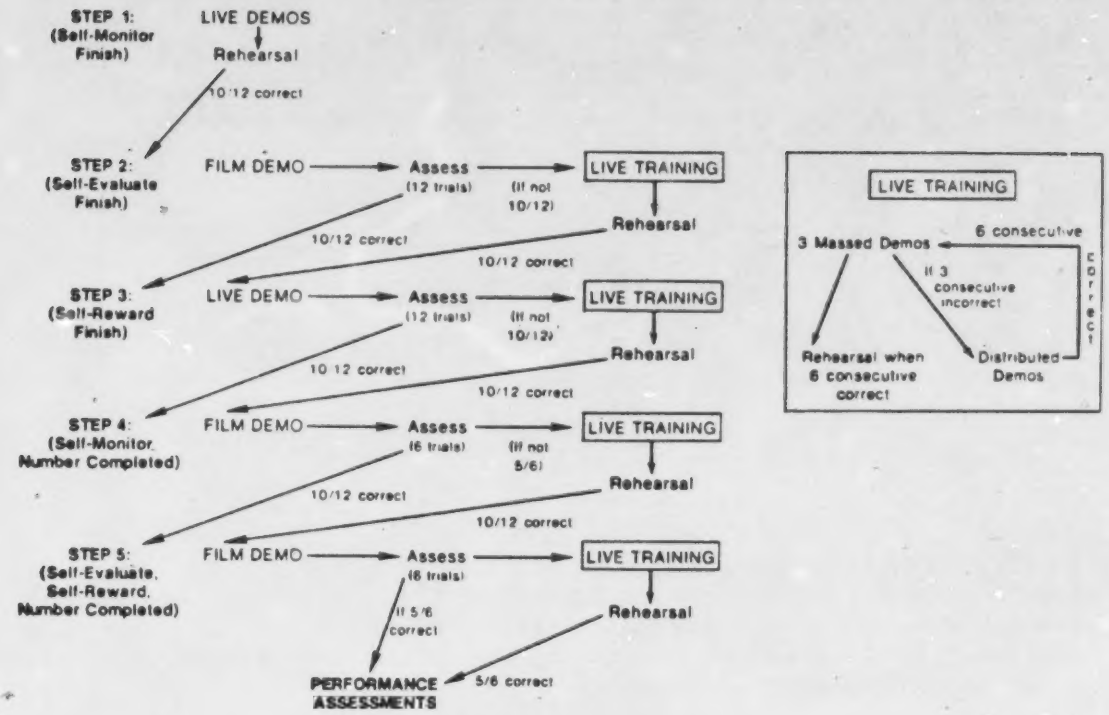
The criterion-based training procedures that we used at each of these five steps is outlined in the following Table.

At Step 1 students were provided with a series of live demonstrations on how to monitor or record when they had finished a single tray of beads. Following these demonstrations they were allowed to monitor their bead stringing performances (i.e., put a marble). They continued until they were correct (i.e., only put a marble in the tube when they finished a tray of beads) on 10 of 12 trials. A brief 10 minute film was presented to students at Step 2 after they had reached criterion on the first step. In this film a colorful clown model was shown stringing beads, monitoring her performance, and then evaluating her performance on 10 trials. On five of the trials she finished stringing the single tray of beads, put a marble in the tube, and turned on the green light while saying "I did a good job." For the remaining five trials our clown model did not finish stringing all the beads in her tray before the red light came on, she did not put a marble in the tube ("not this time, I still have some beads left."), and turned on the red light while indicating that she'd "have to try harder next time."

Table 2

SELF-REGULATORY SKILLS:

CRITERION BASED TRAINING PROCEDURES



Following this film students were presented with 12 trays of beads to string, one at a time. They were instructed to string the beads in the tray until the red light went on signaling them to stop. When they stopped they were to monitor or keep track of whether they finished and to evaluate their performance as the clown "Ruffles" had done. The trainers controlled the onset of the "stop light" and on half of the 12 trials allowed the student to finish and on half stopped the student before s/he finished. If a student correctly self-monitored and self-evaluated on 10 of these 12 trials s/he proceeded to Step 3. On the other hand, a failure to reach criterion performance (i.e., 10/12 at this assessment)led the student to more detailed live demonstration training procedures.

Initially, live training began with three massed demonstrations. That is, the trainer demonstrated appropriate self-monitoring and self-evaluating responses for three trials (e.g., 2 on which the trainer finished, and 1 when s/he did not finish). The student then had a chance to match the trainer's performance on three trials (e.g., 2 finish, 1 not finish). These massed demonstrations (3 at a time) and subsequent student performances continued until 6 consecutive correct matches were accomplished or 3 consecutive incorrect matches occurred. If a student was incorrect on three consecutive trials following massed demonstrations s/he was

exposed to single or distributed trial demonstrations until correct on 6 consecutive trials. Once they reached this criterion they were exposed to the massed demonstration (3 trials at a time) again. The same criterion for moving on from the massed demonstrations was in force—6 consecutive correct. When students reached this criterion they moved on to the rehearsal stage of Step 2. At this point the student was presented with individual trials without prior demonstrations until s/he was correct on 10 of 12. When this criterion was reached students proceeded to Step 3. Thus all trainees were performing at the same level (10 out of 12 correct trials or better) when they were introduced to training at Step 3.

At Steps 3, 4, and 5 the same procedures, with minor modifications, were in effect. For example, at Step 3 a live rather than film demonstration proceeded initial assessment, and at Steps 4 and 5 criterion for moving on (to Step 5 or performance assessments) was 5 out of 6 correct.

Throughout the live training students were provided with prompts to insure that they engaged in the appropriate self-regulatory response. A prompted trial was considered as an incorrect trial. During assessments following film demonstrations (i.e., Steps 2, 4, and 5) and following the live demonstrations at Step 3, students were not provided with corrective prompts. Thus the effects of these demonstrations could be evaluated.

Application of the Package

After identifying students at Mission Beach Fairhaven, who possessed the requisite entering behaviors (e.g., could discriminate between the numbers 1 - 10 finish and not finish, etc.), we delineated four groups of ten students each based on a stratified match of means and variances for IQ, MA, and CA. We used the Slosson Intelligence Test to obtain IQs and MAs.

Table 3

Training Self-Regulatory Skills:

MA, CA, and IQ for the Four Groups

	MA		CA		IQ	
	M	S.D.	M	S.D.	M	S.D.
1. SM, SE, SR, Int.	76.4	15.2	221.5	18.5	39.8	7.8
2. SM, SE, SR, Ext.	75.3	10.7	219.1	20.3	39.2	5.7
3. SM only	74.4	15.8	220.5	16.0	38.8	8.3
4. Control	74.7	15.3	222.5	19.5	38.5	8.2

The first group was trained to self-monitor, self-evaluate and self-reward and was also allowed to set their own standards for performance—the internal group. The second group was also trained in each of these self-regulatory skills but performance standards were set for them by the trainer. These appropriate external standards were set based on the individual's immediate past performance. The standard was set at the level that the individual just performed with the requirement that the standard could never be lowered, only raised.

The third group was trained in self-monitoring only and yoked for experience with the other components to students in the first two groups. Finally, the yoked control group did not receive training in any of the self-regulatory component skills but was exposed to the task. Table 4 shows the actual experiences of each group. As indicated, both the internal and external groups were trained on all 5 steps, and up until this point were treated in the same manner. That is,

Table 4

Design: Acquisition and Effects of

Self-Regulatory Skills

Acquisition

	Groups	Step 1	Step 2	Step 3	Step 4	Step 5
1.	SM, SE, SR, Int.	Train	Train	Train	Train	Train
2.	SM, SE, SR, Ext.	Train	Train	Train	Train	Train
3.	SM only	Train	Control	Control	Train	Control
4.	Control	Control	Control	Control	Control	Control

they had appropriate external standards set for them. The self-monitoring control group was trained on Steps 1 and 4 only. On Steps 2, 3, and 5 this group was exposed to yoked experience with the task of stringing beads and with the manipulation of the apparatus that was equivalent to their yoked partners. That is, students would string beads on an equal number of trials as their trained partners. In addition, they switched the red or green light on the same number of times as their partner and administered an equal number of tokens. But, these responses were not linked to their performance. The control group received this yoked experience at all 5 steps.

Effects of the Demonstrations

As mentioned previously assessments following demonstrations at Steps 2 - 5 allowed for an evaluation of the effectiveness of these live and filmed demonstrations. At each of these assessments the self-monitoring performances of the 2 training and of the self-monitoring control groups was compared to the yoked control. Additionally, the total number of correct self-regulatory trials (12 possible at Steps 2 and 3, 6 possible at Steps 4 and 5) completed by the training groups was compared to the control groups.

A summary of these comparisons presented in Table 4 indicates that the demonstrations (both live and film) were effective in getting students to engage in the desired self-regulatory component skills.

Table 5

Self-Monitoring Performances

	Training-Ext.	Training-Int.	SM-control vs	Yoked control	t-value
Step 2 (12 trials)	11.9	10.6	10.6	7.0	4.30*
Step 3 (12 trials)	11.4	11.9	11.7	6.6	12.05*
Step 4 (6 trials)	4.3	2.1	2.7	0.2	3.44*
Step 5	5.1	4.8	3.2	1.3	4.33*

Total Self-Regulatory Performances

	Training-Ext.	Training-Int. vs	SM-control	Yoked control	t-value
Step 2 (SM & SE)	8.2	6.3	2.8	0.6	3.72*
Step 3 (SM & SE & SR)	10.1	10.7	3.4	0.0	8.68*
Step 5 (SM & SE & SR)	2.9	1.7	0.3	0.0	3.07*

*All t-values had 36 degrees of freedom and were significant ($p < .01$)

Those students exposed to appropriate self-monitoring demonstrations engaged in significantly more correct self-monitoring responses than the yoked control group. At Step 2, 3, and 5 the two training groups significantly outperformed the two control groups on the demonstrated self-regulatory component skills.

These results suggest that the demonstrations were an effective part of the training package. Evaluation of the effectiveness of the package in developing self-regulatory skills (i.e., acquisition and transfer) and the effects of training on task performance and self-concept are presented in the next section.

Evaluation of the Self-Regulation Training Package

Before describing our posttraining assessments and results we should mention that the package was effective in bringing all students to criterion performance at Step 5. The number of sessions required to accomplish this ranged from 5 - 15.

Following this training or yoked experience with the task and apparatus all students were given an opportunity to regulate their performances on the bead stringing task and on two transfer tasks(wood puzzles and foam formboards). On the first day of performance assessment all students were instructed to regulate their behavior and were provided with two demonstrations of what was required. The students were then presented with 10 bead stringing trials. For this task and for the two transfer tasks the internal training group set its own standards for performance on each trial while the remaining groups had appropriate standards for their performance (i.e., same number completed on immediate post trial with the restruction that the standard could never go down only stay the same or increase) set by the experimenter.

The second assessment, conducted on the next day, included instructions and two demonstrations on how to regulate one's performance on the foam formboard task. For the third and last performance assessment a woodpuzzle task was presented without any prior instructions to self-regulate.

These three performance assessments along with the pretest assessment are summarized below:

Self-Regulation

Performance Assessments

1. Pretest:	5 trials of 5 trays: 125 seconds/trial. Groups performed without a standard or instructions to self-regulate.
2. Posttest:	10 trials of 5 trays: 125 seconds/trial. All groups instructed to self-regulate. Internal group set own standard; other 3 groups had an appropriate standard set for them.
3. Transfer 1:	10 trials of 4 formboards (3 pieces/formboard); 45 seconds/trial. All groups instructed to self-regulate. Internal group set own standard; other 3 groups had an appropriate standard set for them.
4. Transfer 2:	10 trials of 5 puzzles (3 pieces/puzzle); 60 seconds/ trial. Nobody instructed to self-regulate. Internal groups set own standards; other 3 groups had an appropriate standard set for them.

Prior to each performance assessment training students (Group 1 & 2) were assessed for their self-regulation accuracy at training Step 5. When correct on 2 consecutive trials the assessment began. On the other hand, if a student was incorrect on 4 consecutive trials they re-entered the training program at Step 5, Live Training. The other groups (3 & 4) received yoked experience prior to assessments.

These performance assessments allowed us to evaluate the effectiveness of our training package in terms of (1) acquired self-regulatory skills, and (2) effects of this training on actual performance. The generalizability of these effects was determined by including an opportunity for performance on tasks similar to the training task with and without specific instructions to "do like you did with the other task."

Acquisition of Self-Regulatory Skills

On each posttest trial (10 bead stringing, 10 foam formboards, 10 wood puzzles) the appropriateness of each self-regulatory component (i.e., self-monitoring, self-evaluation, self-reward) was recorded. In addition, the standards set by the internal group were recorded as were the total number of trials on which each student appropriately self-regulated (i.e., correctly self-monitored, self-evaluated, and self-rewarded). Thus the dependent measures used to evaluate how effective the training was in developing self-regulatory skills included the number of appropriate (a) self-monitoring, (b) self-evaluated, (c) self-reward and (d) self-regulated trials for each of the three tasks.

Bead Stringing. Results of the planned comparisons and examination of Figure 1 reveal that the groups trained to self-monitor did significantly, t (36) = 11.25, $p < .01$, outperform the control group in terms of their self-monitoring performances. In addition, comparisons between the two training and two control groups in terms of self-evaluative, self-reward, and total self-regulation performances indicated that the training groups significantly ($t(36) = 10.24, 6.71, 9.11$, $p < .01$, respectively) outperformed the control groups.

Foam Formboards. On this first transfer task results similar to those found for the bead stringing task emerged. Examination of Figure 2 and results of the planned comparisons demonstrate that the groups trained in a given component skill (e.g., self-monitoring, self-evaluation, self-reward) continued to apply these acquired skills to this task. The trained groups significantly ($p < .01$) outperformed the control groups(s) in terms of accuracy of (a) self-monitoring, t (36) = 4.26, (b) self-evaluation, t (36) = 9.68, (c) self-reward, t (36) = 6.66, and (d) total self-regulation, t (36) = 7.99.

Wood Puzzles. On this transfer task without specific instructions to self-regulate we found that once again the trained groups, significantly ($p < .01$) outperformed the control group(s) on (a) self-monitoring, t (36) = 3.88, (b) self-evaluation, t (36) = 6.52, (c) self-reward, t (36) = 4.80, and (d) total self-regulation, t (36) = 6.03.

Additional orthogonal comparisons between the two training groups (Internal vs. External) and the two control groups (Self-monitoring vs. Yoked) were conducted on the self-evaluation, self-reward, and total self-regulation measures from each performance assessment. Only on this task did differences reach significance. Specifically, the external group significantly ($p < .05$) outperformed the internal

Figure 1

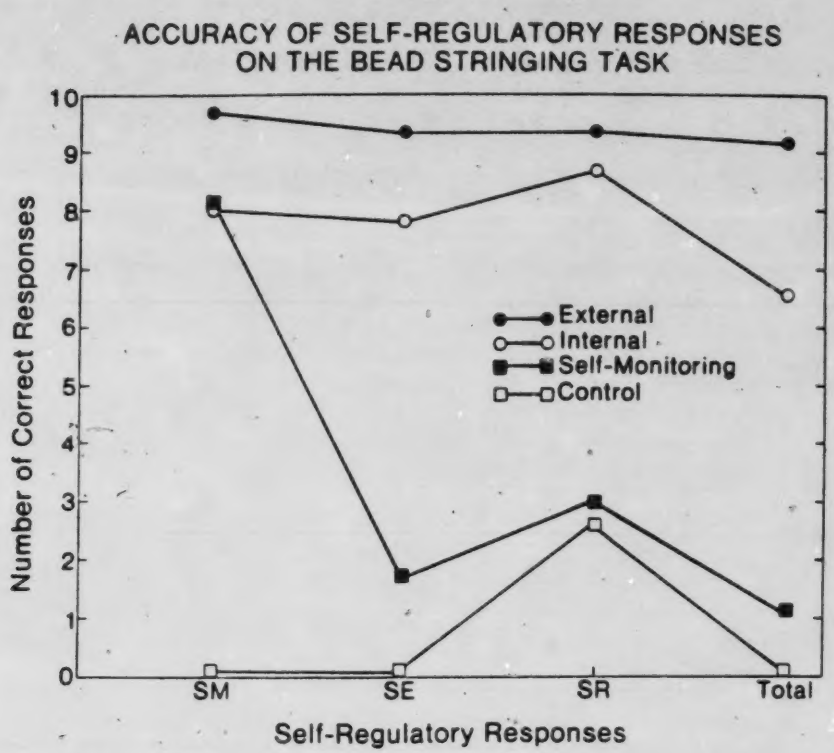


Figure 2

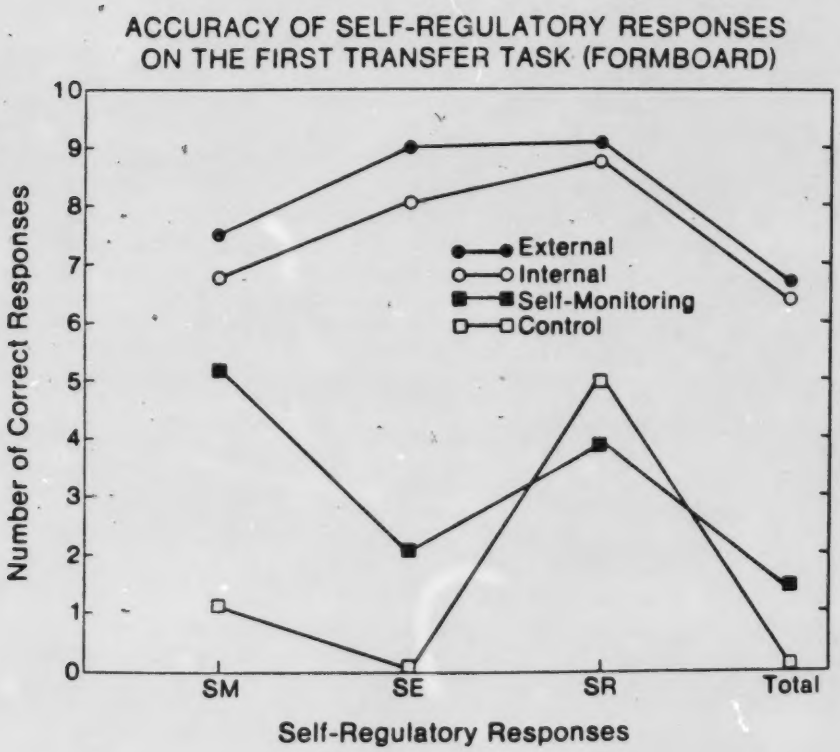


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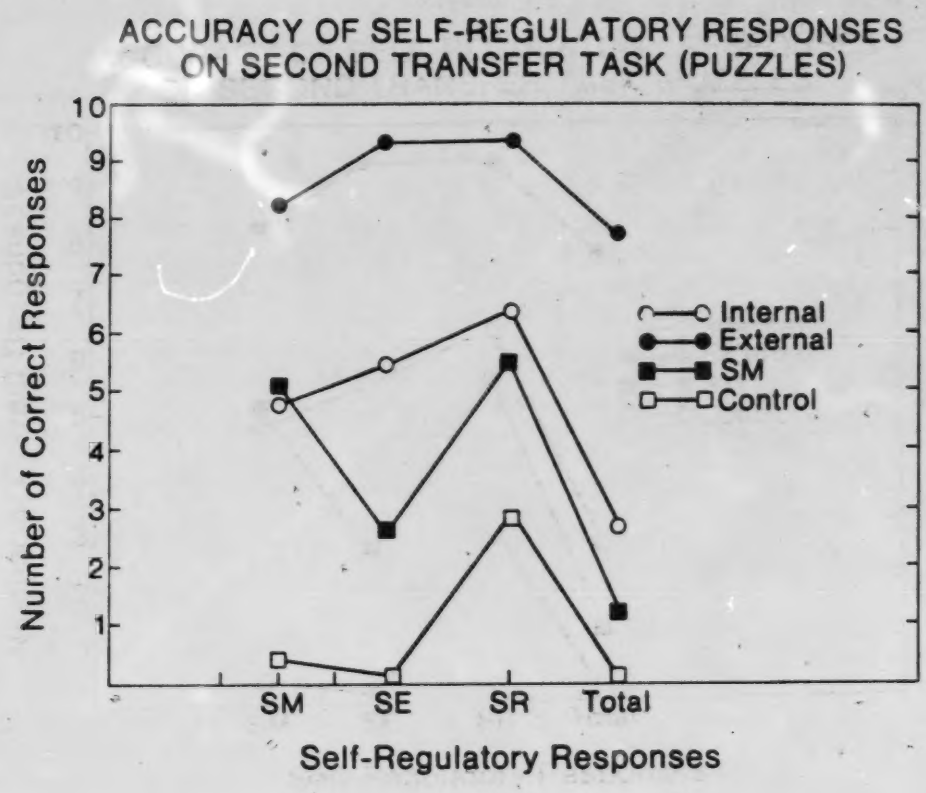
Figure 3


ACCURACY OF SELF-REGULATORY RESPONSES
ON SECOND TRANSFER TASK (PUZZLES)
Number of Correct Responses
10
9
8
7
6
5
4
3
2
1
Internal
External
SM
Control
SM
SE
SR
Total
Self-Regulatory Responses

group on each comparison, (a) self-evaluation, t (36) = 2.95, (b) Self-reward, t (36) = 2.52, and (c) total self-regulation, t = 4.352. These differences can be observed in Figure 3.

Summary. The findings reported above indicate that the students who were exposed to our training package acquired each componet skill, transferred these skills to another task when instructed to do so, and most importantly utilized these acquired skills to regulate their performances on a task without any instructions. While the training students did apply learned self-regulatory responses to the second transfer task, it appears that the group provided with standards for their performance were primarily responsible for this effect. It is possible that the external group was more likely to engage in the self-regulatory component skills as it was provided with an external standard which functioned as a cue to self-regulate.

In any case the results indicate that TMR students can acquire self-regulatory skills and that these skills will transfer to other tasks and situations.

Effects of Self-Regulation Training on Task Performance

As indicated previously students were allowed to work for 125 seconds on each bead stringing trial, 45 seconds on each foam formboard trial, and 60 seconds for each wood puzzle trial. The number of beads strung (25), formboard pieces (16) and puzzle pieces (15) completed on each trial and/or the time required to finish the task was recorded. From this data a rate measure was calculated for each student at each assessment (i.e., beads strung/minute, puzzle pieces completed/minute, formboard pieces completed/minute) The following set of orthogonal planned comparisons were chosen in order to evaluate these dependent measures:

1. Internal and External (Training) vs. Self-monitoring and Yoked (control)

2. Internal vs. External

3. Self-monitoring vs. control

Bead Stringing. Initially we analyzed pretest bead stringing rates to insure that the four groups of students were equivalent in their performance. The results of this analysis, including the three planned comparisons indicated that the groups were well matched in terms of their initial performance levels (all ps >.30).

Analysis of pre-post difference rates did yield a t-value for the first contrast (training vs. control) that was significant, t (36) = 1.99, $p < .05$ (one-tailed test). As can be seen in Figure 4, the internal training group did appear to outperform the external training group but these apparent differences were not significant, t (36) = 0.88, $p > .35$. No differences in the two control groups were found either, t (36) = -.04. We next examined the standards that were set by the internal training group. A criterion, based in part on the external standards provided, was set for an "appropriate" standard. That is, if an internal training student set his standard at one over or at the same number of trays completed on the immediate prior trial it was considered appropriate. For example, if a student finished 3 trays of beads a standard of 3 or 4 on the next trial would be considered appropriate.

Figure 4

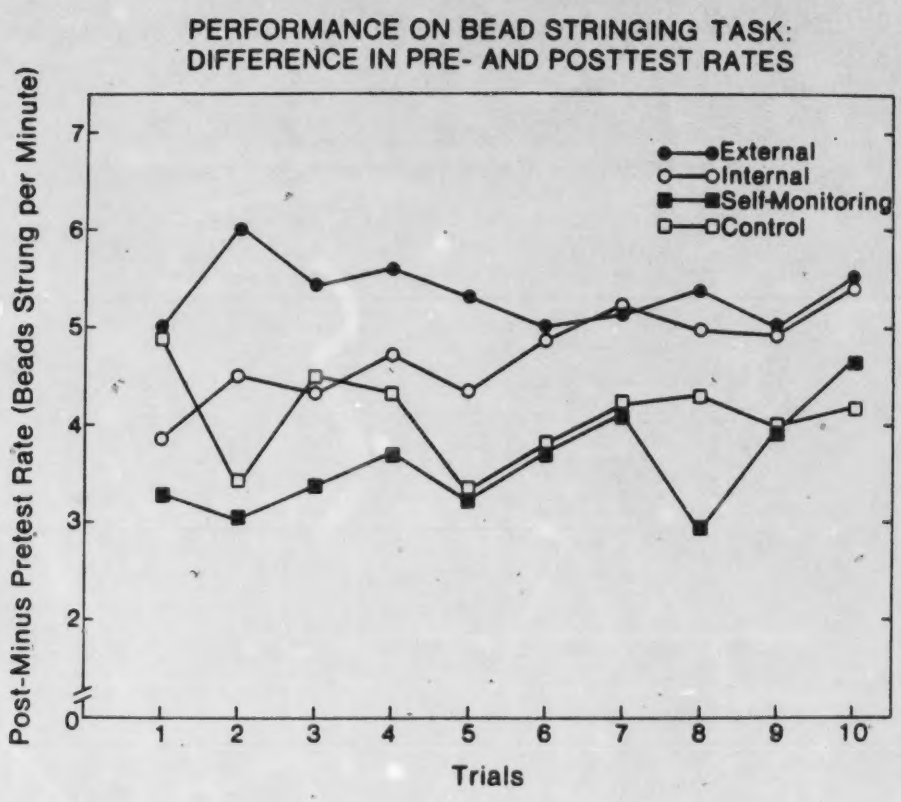
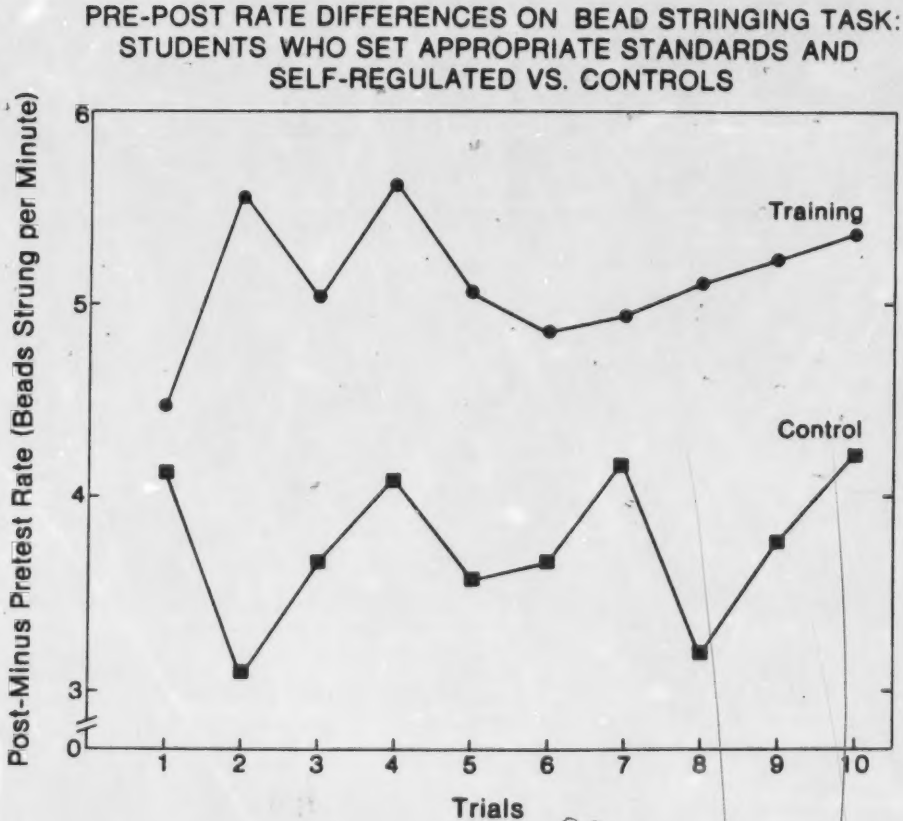


Figure 5



The standards that each internal training student set are summarized below.

BEAD STRINGING: Standards Set by the Internal Treatment Group Relative to Past Performance

	M.R.	L.H.*	B.L.*	D.G.*	L.A.*	S.G.	P.M.	E.F.	C.J.*	N.I.
4 over										
3 over										
2 over	1			3						
1 over	3	8	4	5				4		
Same	1	2	3	2	7	3	2	2	9	6
1 under	4		1		2	3	2	1	1	4
2 under	1		1		1	3	2	2		
3 under						1	2	1		
4 under			1				2			

**Student who set appropriate standards (Standard was equal to or 1 over immediate past total on at least 7/10 trials)*

Examination of this Table indicates a number of students set standards that were quite variable; sometimes the same, sometimes under, sometimes over their past performance. On the other hand, some students (*) did set appropriate (by our criterion) standards most of the time (70%).

In addition, there were some external and internal training students who did not appropriately self-regulate during the bead stringing posttest. Since we were interested in evaluating the effects of self-regulatory skills on performance we excluded those training students who did not self-regulate on at least 60% of the trials and/or who did not set appropriate standards on at least 70% of the trials in our next analysis. The MAs ($\underline{M}$ = 77.9 and 73.4) CAs ($\underline{M}$ = 214 and 214.4), IQs ($\underline{M}$ = 40.6 and 38.7) and bead stringing pretest performances ($\underline{M}$ = 8.5 and 7.0) for the revised training and control groups, respectively did not differ significantly.

A $\underline{t}$-test of performance differences indicated that this revised training group significantly outperformed the control group, $\underline{t}$ (30) = 1.76, $\underline{p} < .05$, one-tailed. Thus, when students exposed to the training package did engage in appropriate self-regulatory skills they signficantly outperformed students who did not have an opportunity to acquire these skills (see Figure 5).

Foam Formboards. The performance of the four groups on the formboard transfer task over the 10 trials is presented in Figure 6. Again, the dependent measure was a rate measure, in this case, the number of pieces completed per minute. Only the comparison between the internal and external training groups was significant, $\underline{t}$ (36) = 1.86, $\underline{p} < .05$ (one-tailed test). The external group (see Figure 6) performed at a higher rate than the internal group.

Figure 6

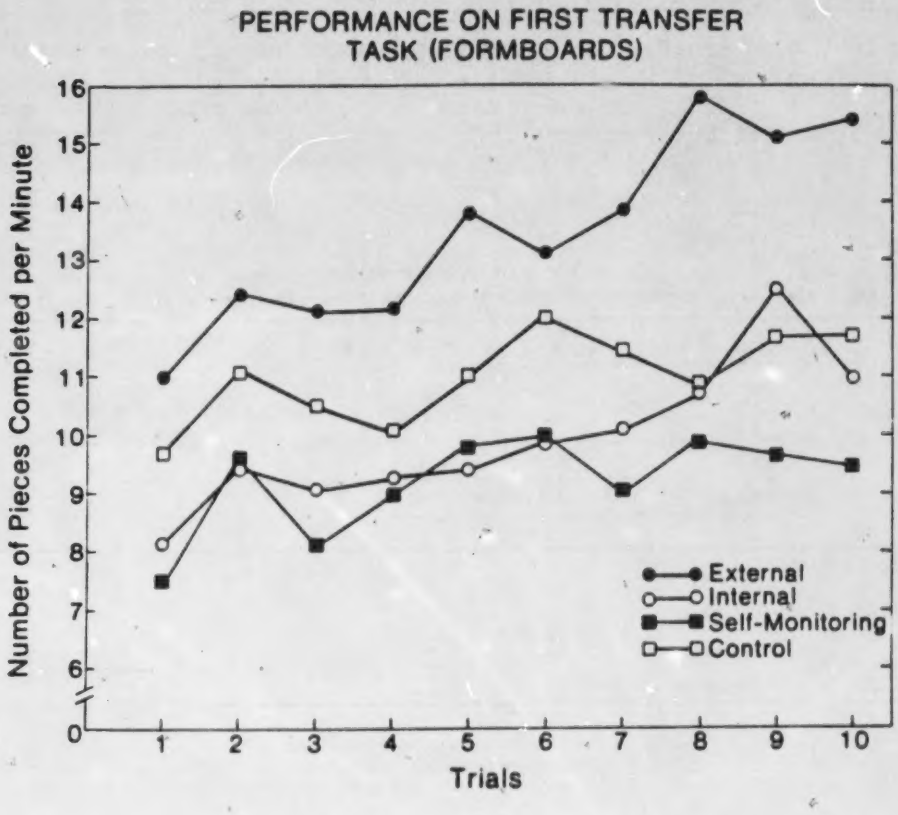
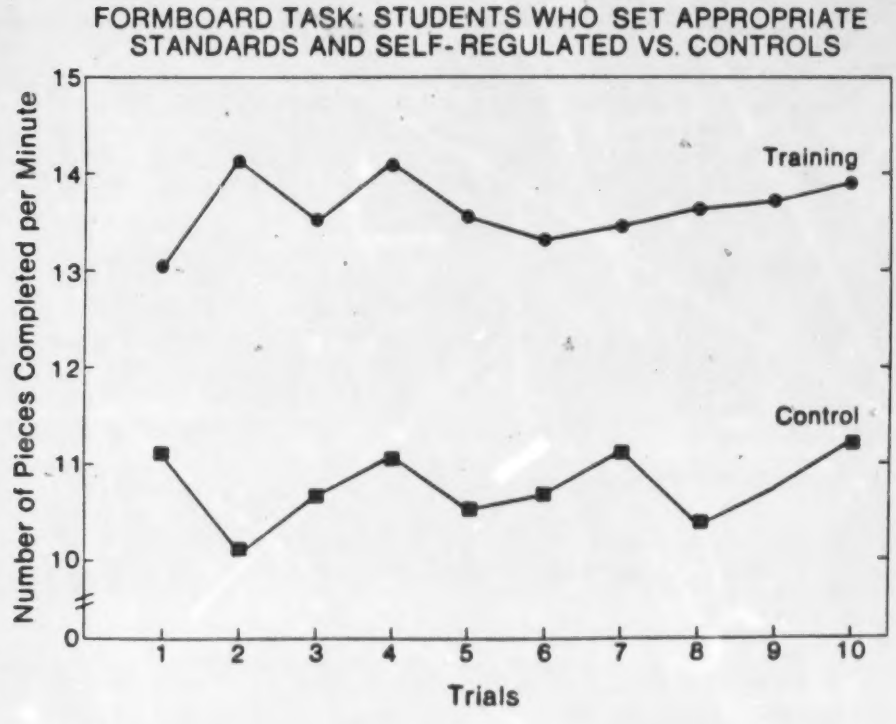


Figure 7


FORMBOARD TASK: STUDENTS WHO SET APPROPRIATE STANDARDS AND SELF-REGULATED VS. CONTROLS
Number of Pieces Completed per Minute
Trials
Training
Control

While the external group appeared to outperform the two control groups, the poorer performances of the internal group precluded finding differences in the training vs. control groups when the external and internal groups were combined. We again looked at the standards that the internal group set (see Table below).

FIRST TRANSFER TASK (Formboard): Standards Set by the Internal Treatment Group Relative to Past Performance

	M.R.	L.H.	B.L.	D.G.	L.A.*	S.G.	P.M.	E.F.*	C.J.*	N.I.
4 over										
3 over	7		1	1						
2 over	1	8	4	4	1	3	2		1	5
1 over	1		4	3		4	4	4	8	4
Same	1	2	1	2	9	2	2	6	1	1
1 under						1	2			
2 under										
3 under										
4 under										

** Student who set appropriate standards (Standard was equal to or 1 over immediate past trial on at least 7/10 trials.)*

It appears that on the formboard transfer task, most of the internal students set inappropriately high standards. There were three students (*) who did set appropriate standards on at least 7 out of 10 trials. When we compared the formboard performances of the internal students who set appropriate standards to those who set inappropriate standards using a Mann-Whitney test of ranks we found a difference. The students who set appropriate standards significantly ($p < .05$) outperformed those who set inappropriate standards. It appears that the lower performance in the internal training group might be due to the fact that 7 out of 10 students set inappropriate standards for their performance. And, as some have claimed (e.g., Bandura, 1977; Kanfer, 1977; Spates & Kanfer, 1977) these standards are most important in determining performance.

Just as with the bead stringing task, the two training groups were combined into one group which included only those students who had appropriate standards and who had generalized the self-regulatory skills to the formboard task. Again no significant differences in the MAs (M = 81.6 and 74.9), CAs (M = 213.1 and 219.9), and IQs (M = 42,6 and 39.4) of the training and control groups, respectively, were found.

If one now looks at the performance of these revised groups over ten trials on the formboard task (see Figure 7) there does appear to be a difference between the training and control groups. A t-test comparing the means of the two groups does in fact reveal a difference between the two groups which is significant at the .05 level, t (28) = 2.08.

It thus appears that as with the bead stringing task, if one looks at those

students who did generalize the self-regulatory responses to the formboard task, and also had appropriate standards, then a significant difference in performance between the training and control groups is evidenced.

Wood Puzzles. The performance of the four groups over ten trials on the second transfer task is presented in Figure 8. Again the dependent measure was the number of pieces completed per minute. The comparison between the two training groups and the two control groups was significant, $\underline{t}$ (36) = 1.84, $\underline{p} < .05$ (one-tailed test). Thus there was some indication that training in self-regulatory responses did lead to a change in performance, in this case, on a wood puzzle task. Examination of Figure 8 and the results of the planned comparison indicate that the external group did perform at a higher rate than the internal group, $\underline{t}$ (36) = 3.09, $\underline{p} < .01$. In examining the summary table of the standards set by the internal group they again appear to be quite variable and in most cases inappropriate.

SECOND TRANSFER TASK (Puzzle): Standards Set by the Internal Treatment Group Relative to Past Performance

	M.R.	L.H.	B.L.	D.G.	L.A.*	S.G.	P.M.	E.F.*	C.J.*	N.I.
4 over	1									
3 over	2					1				4
2 over	2					1	2			5
1 over	3					3	4	4	1	1
Same	2	2	9	3	10		2	3	8	
1 under		4	1	4		1	2		1	
2 under		4		2		2				
3 under				1		2				
4 under										

*Student who set appropriate standards (Standard was equal to or 1 over immediate past trial or at least 7/10 trials.)

When we compared (Mann-Whitney Test of ranks) those training students who appropriately self-regulated and those who did not, we found that the students who appropriately self-regulated performed significantly ($\underline{p} < .05$) better than those training students who did not self-regulate.

Finally, as with the bead stringing task and the formboard task, the two training groups were combined into one group which included all those students who had appropriate standards and who had generalized the self-regulatory skills to the wood puzzle task. These revised groups had similar MAs ($\underline{M}$ = 81.4 and 74.0), CAs ($\underline{M}$ = 217.2 and 219.8) and IQs ($\underline{M}$ = 42.4 and 39.0). Comparison of these two groups' performance on the wood puzzle task and examination of Figure 9 indicate that the self-regulating groups significantly ($\underline{t}$ (23) = 3.34, $\underline{p} < .01$) outperformed the control group (see Figure 9). Thus, students who did self-regulate and had

Figure 8

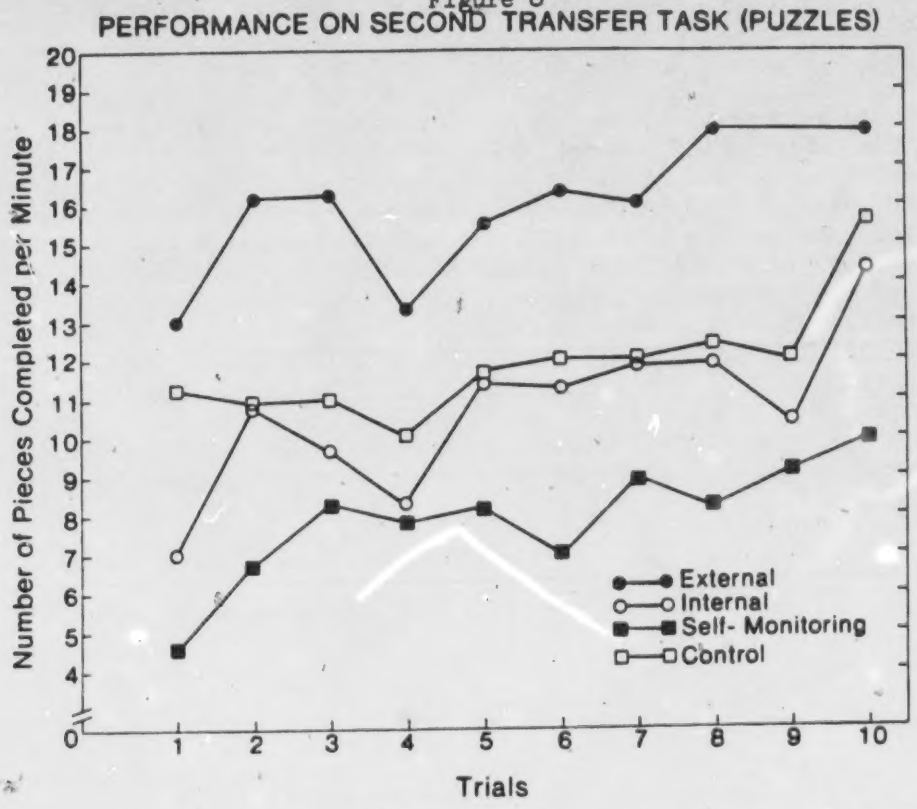
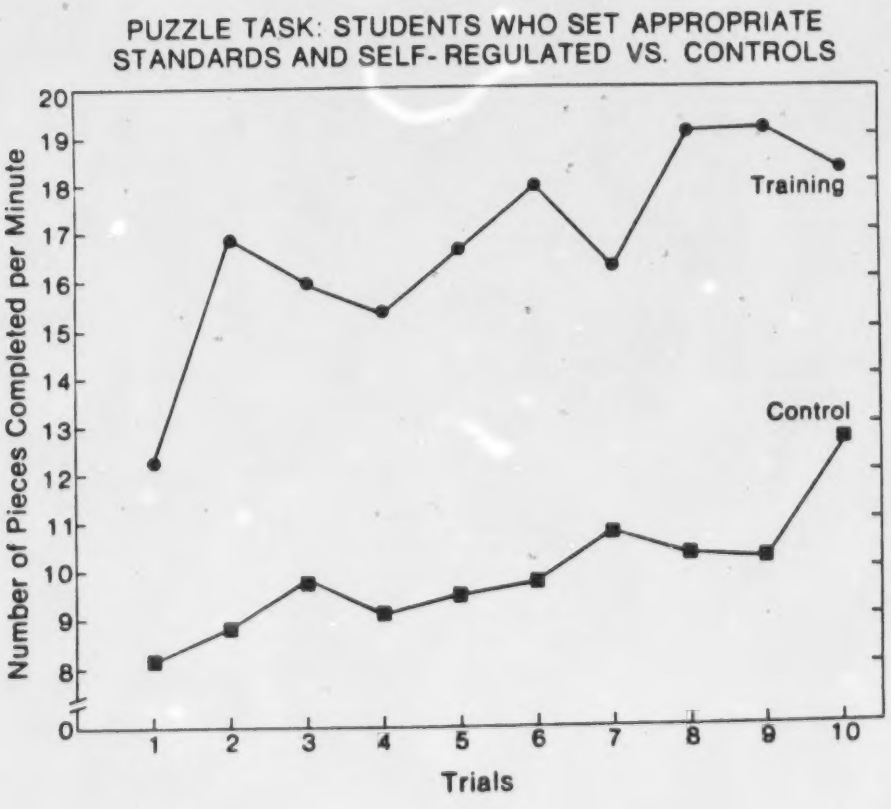


Figure 9


PUZZLE TASK: STUDENTS WHO SET APPROPRIATE STANDARDS AND SELF- REGULATED VS. CONTROLS
Number of Pieces Completed per Minute
Trials
Training
Control

appropriate standards outperformed students who did not have an opportunity to learn how to regulate their own performances.

Summary. The results demonstrate that those students who were exposed to our training package significantly outperformed control students on the bead stringing task and on the second transfer task (wood puzzles). This latter finding is most important as it suggests that students who have been taught to regulate their own performances can generalize these responses to a task when they are not instructed to do so, and that their performances on the task can be significantly improved relative to students who did not learn how to regulate their own behavior.

When we examined the standards that the internal group set we found that they were, in most cases, inappropriate. That is, they set standards for their performances that were not related to how they had performed previously. We found that on the formboard task students who set appropriate standards outperformed those who set inappropriate standards. This result is consistent with previous claims (e.g., Spates & Kanfer, 1977) that standard setting is a most important, if not the most important, self-regulatory component skill.

In addition, some of the training students did not appropriately regulate their responses during the various performance assessments. Performance differences on the wood puzzle task between students in the training group who did and did not self-regulate were found. Thus within the training group we found that appropriate self-regulation affected task performance.

When we attempted to take these two factors (i.e., appropriateness of standards set by the internal training group and appropriateness of self-regulatory responses) into account we found that the training groups significantly outperformed the control groups on each of the three tasks.

Thus there is strong evidence indicating that TMR students can not only acquire self-regulatory skills but can also utilize them to effectively control their own behavior. We should mention that the effects of self-regulation training on task performance was evaluated relative to groups who had appropriate external standards set for them. In addition, one control group had been taught to monitor its own performance. Even with these conditions the training groups outperformed the control groups indicating the power of acquired self-regulatory skills (i.e., self-evaluation and self-reward) to affect performance.

Effects of Self-Regulation Training on Self-Concept

As mentioned in the introduction we had hypothesized that the success experiences and greater feelings of competence which we assumed would be associated with the acquisition of self-regulation skills would result in concomitant increases in the students' self-concepts. One of the first stumbling blocks we encountered was the selection of appropriate measures for assessing self-concept in our population of TMR students.

Instruments useful with nonretarded populations are usually inappropriate for retarded populations because of the latter's poorer or non-existent reading and verbal skills and their alleged inadequacies in perceiving and describing their own inner feelings (see Gallagher, 1959). And, in our review of the literature we have been unable to uncover any previous quantitative attempts to measure self-concepts of moderately retarded (TMR) individuals.

Thus, in attempting to evaluate the effects of our self-regulation training package on self-concept we had to develop our own measuring devices or adapt others for our use.

Measures. We decided to assess each child's self-concept via self-report and reports from significant others (i.e., parents and teacher). A rating scale, appropriate for teacher ratings of student performance in a classroom (see McDaniel, 1973) was selected. This Inferred Self-Concept Scale consists of 30 descriptive statements (e.g., "Enjoys working with others") and examples of each (e.g., "For example, student may smile, laugh, or look pleased when engaged in productive group activity.") which are rated as applying to a given student on a 5 point likert scale (never to always).

A second rating scale, one that would be appropriate for both parent and teacher reports, was developed by us. This scale, Student Rating Form (SRF) consisted of 15 descriptive statements which were similarly rated on a 5 point likert scale (never to always). The specific items rated were; (1) Enjoys trying to do something new, (2) Prefers to be helped when working on a task he/she is capable of doing by self, (3) Feels good about the quality of his/her schoolwork, (4) Appears to genuinely like him/herself, (5) Appropriately indicates desires by speaking up in a group of peers, (6) Feels comfortable speaking up when interacting with adults, (7) Prefers tasks or games involving skill rather than those involving luck, (8) Prefers to be someone else, (9) Feels he/she is well liked by the other kids, (10) Takes credit for his/her own positive actions or accomplishments, (11) Accepts responsibility for his/her own wrong doings or errors, (12) When unjustly teased by others, he/she agrees without protest or any attempt to defend self, (13) Feels like others pick on him/her too often, (14) Likes to start things on his/her own, (15) Takes pride in his/her personal appearance.

Our final measuring instrument was one that sought reports from each individual student. This Self-Concept Measure (SCM) was developed with the intention of assessing the same 15 items presented on the SRF. The items on the SCM and SRE were adapted from McDaniel's Scale (1973) or for our purposes, had face validity.

On the SCM students were asked to indicate what they were more like. They were given two descriptions and had to select one as more like them (i.e., forced choice). One option was indicative of a positive self-concept the other of a

negative self-concept. In some cases our students did not respond to or indicated that they did not understand the item. When this happened we presented the child with two pipe cleaner figures and identified each figure as one of the two options. The child was to "point to the one that is most like you."

In order to assess the understanding of our students we included three items that could be used as checks (e.g., boy vs. girl; child's name vs. John or Mary; watching TV or answering questions). The SCM is presented in Table 1.

Design. Prior to and following participation in the self-regulation training program measures of self-concept were obtained from parents (SRF), teachers (McDaniel Scale, SRF) and students (SCM).

Results. Scores on each scale were converted to standard scores. A series of *t* tests were performed on standardized change scores (i.e., pre-post standard score differences) comparing the training and control groups. All resultant *t* values were nonsignificant.

We examined the correlations between the various self-concept measures. The teachers appeared to be consistent in their ratings of each child across the SRF and McDaniel Scale (r (78) = .719, $p < .01$). Additionally, the parents and teachers ratings on the SRF were related (r (54) = .387, $p < .01$). And finally, the ratings of the teachers on the SRF corresponded to student reports on the SCM (r (77) = .254, $p < .05$).

Summary. The pattern of intercorrelations of the four self-concept measures does suggest that the measures did have some concurrent validity. On the other hand, analyses of changes on these measures as a function of exposure to the self-regulation training package did not reveal any benefits of the training. It is important to note that the failure to find significant effects of the training may be due to the measures used and/or to the fact that our training did not affect self-concept.

Our guess, after working with these students, is that the relatively brief period of training and actual self-regulatory performance was not sufficient to increase general self-concept as measured by our ratings scales.

Table 1

Total Self-concept Score _____/15

Total Validity Score _____/3

Child's Name _____

Date _____

Exp's Name _____

SELF-CONCEPT MEASURE FOR TMRS

Instructions: Each child is tested individually. The experimenter first explains to the child that he is going to ask him/her some questions and that he wants the child to answer as best he can. Each question is asked using sex-appropriate gender. The experimenter records the child's answer as close to verbatim as possible in the space following each question. The first question is asked directly and then using the pipe cleaner figures to give the child an example of the type of questions that will follow. Each question is asked directly first. If the child does not give an appropriate answer, the experimenter goes to the pipe cleaner question corresponding to that question. The experimenter should point to the figure on the left and then to the figure on the right as he describes each figure. After describing each figue, the experimenter then says, "Point to the one that is most like you." Repeat the entire pipe cleaner question until the child responds by pointing to one of the figures.

Scoring: Circle the number (1 or 0) corresponding to the answer given by the child. Simply put a check mark beside the appropriate statement (correct or incorrect) for the three items in the test that are used to assess validity. Total self-concept and validity items at the end of the test.

1. Are you a boy or a girl? _____ correct _____ incorrect

1a. Now let's pretend that this figure is a boy and this figure is a girl.
_____ correct _____ incorrect

2. Would you rather try a game that's new or a game that you've played before?
1 new 0 played before

2a. This boy/girl would rather try a new game. This boy/girl would rather try a game that he/she's played before.
1 new 0 played before

3. If you're working in class and you can do the job by yourself, would you rather ask for help from the teacher or finish the job by yourself?
0 ask for help 1 no help

3a. These boys/girls are working on a job they can do by themselves. This boy/girl asks for help from the teacher. This boy/girl finishes the job by himself/herself.
0 asks for help 1 no help

4. Are you not-too-proud of the work you do in school or are you proud of the work you do in school? 0 not-too-proud 1 proud

4a. This boy/girl is not-too-proud of the work he/she does in school. This boy/girl is proud of the work he/she does in school.
0 not-too-proud 1 proud

5. Are you one of the best kids in your class or are you not one of the best kids in your class? 1 best 0 not best

5a. This boy/girl thinks he/she is one of the best kids in the class. This boy/girl does not think that he/she is one of the best kids in the class.
1 best 0 not best

6. Are you too shy to talk to the other kids very much or do you like to talk to the other kids? 0 shy 1 not shy

6a. This boy/girl is too shy to talk to the other kids. This boy/girl likes to talk to the other kids. 0 shy 1 not shy

7. When you are at a house with a lot of grown-ups and you are thirsty, do you ask for a drink or are you too shy to ask for a drink?
1 asks 0 too shy

7a. These two boys/girls are at a house with a lot of grown-ups and they are both thirsty. This boy/girl asks for a drink. This boy/girl is too shy to ask for a drink. 1 asks 0 too shy

8. Are you child's real name or are you John/Mary?
_____ correct _____ incorrect

8a. This boy's/girl's name is child's real name. This boy's/girl's name is John/Mary. _____ correct _____ incorrect

9. Would you rather play a game that you can get good at or a game that you can get lucky at? 1 good 0 lucky

9a. This boy/girl likes games that he/she can get good at. This boy/girl likes games that he/she can get lucky at.
1 good 0 lucky

10. Would you rather be yourself or someone else? 1 self 0 someone else

10a. This boy/girl would rather be himself/herself. This boy/girl would rather be someone else. 1 self 0 someone else

11. Do you have only a few friends or a lot of friends? 0 a few 1 a lot

11a. This boy/girl has a few friends. This boy/girl has a lot of friends.
0 a few 1 a lot

12. If you did a good job and the teacher asks who did a good job, do you keep your hand down or do you raise your hand? 0 hand down 1 raise hand

12a. These two boys/girls did a good job and the teacher asks who did a good job. This boy/girl does not raise his/her hand. This boy/girl raises his/her hand. 0 not raise hand 1 raises hand

13. Are you home watching TV or are you here answering questions?
_____ correct _____ incorrect

13a. This boy/girl is home watching TV. This boy/girl is here answering questions. _____ correct _____ incorrect

14. If you do something bad and the teacher asks who did it, do you raise your hand or do you keep your hand down?
1 raises hand 0 hand down

14a. These two boys/girls did something bad and the teacher asks who did it. This boy/girl raises his/her hand. This boy/girl keeps his/her hand down.
1 raises hand 0 hand down

15. If you're playing and someone makes fun of you, do you stay quiet or do you tell them to leave you alone? 0 stays quiet 1 leave alone

15a. These two boys/girls are playing and someone makes fun of them. This boy/girl stays quiet. This boy/girl tells them to leave him/her alone.
0 stays quiet 1 leave alone

16. Do other kids make fun of you a lot or just once in awhile?
0 a lot 1 once in a while

16a. This boy/girl thinks that other kids make fun of him/her a lot. This boy/girl thinks that other kids make fun of him/her just once in awhile.
0 a lot 1 once in awhile

17. When you want to play ball, do you get the ball yourself or do you wait for someone else to get the ball?
1 gets ball 0 waits for others

17a. When this boy/girl wants to play ball, he/she gets the ball himself/herself. When this boy/girl wants to play ball, he/she waits for someone else to get the ball. 1 gets ball 0 waits for others

18. Do you go to school in the morning after making sure you're neat and clean or do you go to school without making sure you're neat and clean?
1 neat and clean 0 not neat and clean

18a. This boy/girl checks to make sure that he/she is neat and clean before going to school. This boy/girl does not make sure that he/she is neat and clean before going to school.
1 neat and clean 0 not neat and clean

Follow-up Study: Effects of Self-Regulation Training on Task Performance

While the results of the previously reported study demonstrate that TMR students can acquire self-regulatory skills and that these skills affect task performance a number of questions remain. First and foremost is the question of whether TMR students can learn to set appropriate standards for their own performance. This appears to be most crucial as standards seem to be important in determining actual task performance.

Other concerns dealt with in this follow-up study include modifying the training package to (a) accomodate another task, (b) insure acquisition of self-regulatory skills, and (c) reduce training time.

Method

The same students who participated in the previous study took part in this follow-up study. Of the 40 students who participated in this prior study, 28 returned to school following the summer break. Fourteen had received previous training in the component self-regulatory skills; self-monitoring, self-evaluation, and self-reward and 14 had served as controls. The 14 students who had received previous training in self-regulation were assigned to 2 groups of 7 students each and the 14 control students were assigned to 2 groups of 7 students each based on a stratified match of means and variances for bead stringing pretest performance, IQ, MA, and CA.

The two groups that had received prior training were then randomly assigned to either(1)self-regulation with external standard or a (2) self-regulation with internal standards training group. The control groups were randomly assigned to (1) an external standard only or (2) a no standard control group. Means and standard deviations of the IQ, MA, CA, and pretest bead stringing performance for the four groups are presented in Table 1.

Table 1

Means and standard deviations for IQ, MA, CA, and pretest bead stringing performance

Group	IQ		MA/months		CA/months		BPRE	
Training:	M	S.D.	M	S.D.	M	S.D.	M	S.D.
External Standard	40.1	5.3	76.9	10.0	221.1	19.9	8.1	2.9
Internal Standard	40.3	7.7	77.0	14.6	216.7	12.5	7.4	2.6
Control:								
External Standard	38.9	7.1	74.3	14.0	218.6	17.4	7.0	3.2
No Standard	39.0	7.6	74.7	14.2	221.4	15.1	7.6	3.0

Task. The same apparatus described in the previous study was utilized. It was modified slightly to accommodate self-regulatory responses directed at controlling performance on a design matching task. The design task required students to match 7 designs presented via a stimulus card. Each design on the stimulus card was drawn to scale and consisted of 5 component pieces that varied in color (light blue, dark blue, black, white, green, orange, red, black or yellow) and shape (square, rectangle, triangle, or parallelogram). These pieces were presented in various positions with the only requirement being that each piece always touched at least one other piece. A wooden tray which contained 7 small compartments for each design and one large compartment for the 35 foam rubber pieces needed to match all 7 designs was presented to the student on each trial.

General Procedure. Two students at a time were brought to the mobile research lab for approximately 1 hour a day over a total of 4-8 days. Students received either training on the self-regulatory skills or were only given an opportunity to work on the design matching task. All the students received tokens which were self-administered or given to them by the experimenter at the end of the session. Tokens could be traded in immediately for small prizes such as hair brushes and toy cars or saved for more expensive items such as records, books, jewelry, and posters. The two training groups were first assessed on their ability to appropriately self-regulate on the design task and then received training, if necessary, in self-regulation. The performance of all four groups was then assessed on the design task.

Assessment. Students in the two training group were initially assessed in pairs to determine if they could appropriately self-monitor, self-evaluate, self-reward and set standards (internal standard group only) on the design task. During this assessment students were presented with 12 trials but did not actually perform on the design task. They were presented with a predetermined number of design pieces completed on each trial and told to self-regulate based on the number of designs completed. If the student correctly self-monitored, self-evaluated, self-rewarded, and set standards (internal standard group only) on 10 of the 12 trials s/he proceeded to the performance assessment stage. On the other hand, failure to meet this criterion resulted in the student being trained to self-regulate on this task.

Prior to the presentation of this 12 trial assessment the experimenter-trainer demonstrated appropriate self-regulation on four trials. That is, the experimenter-trainer presented a stimulus card and said:

> We are going to be putting together these designs. For now, let us suppose that we already did the work. First I am going to take a turn and then you are going to take a turn. Let's say my standard is 1. I am going to try and finish 1 design before the red light comes on. When the red light comes on, let us suppose this is the work I had done. I put in one marble for each design that I finish. I finished 4 designs so I put in 4 marbles. I look and see if I met my standard; if I see a marble above the marker, then I met my standard. I see a marble above the marker. I did a good job so I turn on the green light and I give myself a token because I met my standard and I did a good job. O.K., now it is your turn to do just what I did. Let's say you have a standard of 1 and suppose this is the work you had done when the red light came on. What would you do?

Both students would then attempt to do exactly what the experimenter did. The experimenter gave verbal feedback and praise to the students while they were engaging in the self-regulatory behaviors. The experimenter then demonstrated a trial in which the standard was not met with the students again being given the opportunity to do exactly what the experimenter did. The experimenter then demonstrated the appropriate self-regulatory behaviors for two consecutive trials. After both students had an opportunity to perform on two consecutive trials their accuracy on 12 consecutive trials was assessed.

Training. The training procedures utilized to train both groups was similar to the procedure in the previous study. That is, it was criterion-based and utilized live demonstrations, verbal feedback, and praise.

For each self-regulatory behavior (e.g., self-monitoring, self-evaluation, self-reward, or standard setting on the internal group only) that the student failed to correctly engage in on at least 10 out of 12 consecutive trials during assessment, s/he was given additional training. During training the student did not actually perform on the design task. A predetermined number of designs was layed out by the experienter-trainer before each trial and the student only received experience in the self-regulatory skills.

Training began with massed demonstrations in which the experimenter correctly, self-monitored, self-evaluated, self-rewarded and set standards (in the internal group) on three consecutive trials with corresponding verbal instructions. The student was then instructed to match the experimenter's performance on the same three trials. During massed demonstrations, the students' errors were corrected (e.g., "What did you forget, that's right, you did not meet your standard, so you turn on the red light and do not push the token button"). The criterion for massed demonstrations was reached when the student matched the experimenter's performance on all three trials (without corrections) for two consecutive turns.

If a student could not match the experimenter's performance on the three trials during any of four consecutive turns, the student was provided with single distributed demonstrations. During distributed demonstrations, the experimenter demonstrated one trial followed by an identical trial for the student. When three consecutive single trials were correctly performed, the student was then provided with massed demonstrations again.

Criterion performance on the massed demonstrations was followed by a rehearsal phase. During rehearsal students were given the opportunity to demonstrate the appropriate self-regulatory component behaviors on 12 consecutive trials without corrections or instructions. If the student appropriately self-regulated on at least 10 out of 12 trials, s/he proceeded to performance assessment. If the student failed to reach criterion on rehearsal, he was again provided with massed demonstrations. Thus, at the conclusion of training all students were self-regulating at the same degree of proficiency (at least 10 out of 12 correct trials). The internal training group was taught to set their standard at the last score they obtained.

Performance Assessment. Students had an opportunity to actually work on the design matching task during this assessment period. They were presented with 10 trials/day for a four day period. A different stimulus card was presented on each trial so the student never had the opportunity to put together the same series of designs twice. Each day, prior to assessment, the two training groups had to reach criterion on a self-regulation accuracy assessment test. The external training

students had to correctly self-monitor, self-evaluate, and self-reinforce on at least 5 out of 6 consecutive trials while the internal training students had to correctly set standards as well as correctly self-monitor, self-evaluate, and self-reinforce on at least 5 out of 6 consecutive trials. Again, students did not put the designs together, rather, the experimenter set out a predetermined number of designs for each accuracy trial. If a student did not reach criterion on this accuracy assessment, s/he was provided with additional self-regulation training prior to presenting the 10 performance assessment trials on each day. All students were told:

> Now you are going to put the designs together all by yourself. I want you to work until the red light comes on. The designs go together just like this. (The experimenter put together the first design on the stimulus card). Be sure that each piece is the right color and shape (points to piece on stimulus card and corresponding piece in the tray) and in the right position. Do one design at a time, putting one design in each tray. Finish one design before starting another.

Students in the External Standard training group were also told to:

> Remember to put in one marble for each design that you finish. If you meet your standard, if you see a marble above the marker, then switch on the green light and push the white button to give yourself a token. If you do not meet your standard, if you do not see a marble above the marker, then switch on the red light and do not push the white button. Let's set your standard at one. I want you to try and finish at least one design before the red light comes on.

Students in the Internal Standard Training group were told to:

> Remember to set your standard equal to whatever you got on your last trial. It should be set equal to the top marble in the tube. If there are no marbles in the tube, your standard is equal to 1. Put in one marble for each design that you finish. If you meet your standard, if you see a marble above the marker, then switch on the green light and push the white button to give yourself a token. If you do not meet your standard, if you do not see a marble above the marker, then switch on the red light and do not push the white button. O.K., let us suppose that your standard was one and you had finished one design. What would your standard now be?

Students in the External standard control group were told:

> Let's set your standard at one. I want you to try and finish at least one design before the red light comes on.

Each student was given two minutes per trial to finish as many designs as s/he could. There was one practice trial and ten assessment trials.

Data Collection. The accuracy of each self-regulatory response for the training groups was recorded. In addition the following performance data was

collected on each trial;performance output (e.g., the total number of designs and design pieces completed) and performance accuracy (the number of designs and design pieces completed correctly). A design piece was considered correct if it was the same color, same shape, and in the same position as the corresponding design piece on the stimulus card. A design piece was considered to be in the correct position if it (1) was not separated from another piece by more than 1/4 of an inch and (2) was not rotated more than ninety degrees from the piece's original position on the stimulus card. A design was considered to be completed correctly if all 5 pieces of the design were the same color, same shape, and in the same position as the corresponding design on the stimulus card. An independent observer was brought in two times during performance assessment and there was a 96% agreement between observer and experimenter on the scoring of correctness of design pieces and a 85% agreement on the scoring of correctness of completed designs.

Results

The major dependent variables were; (1) appropriateness of self-regulation for the two training groups, (2) performance output; total number of design pieces completed per day and total number of designs completed per day, and (3) performance accuracy; proportion of design pieces completed correctly per day and proportion of designs completed correctly per day. For the external standard training group, a correct self-regulatory response was one in which the subject correctly self-monitored, self-evaluated, and self-reinforced while the internal standard training group had to also set an appropriate standard. The performance accuracy measures were calculated by dividing the number of pieces or designs correctly completed by the total number of pieces or designs completed, respectively. The dependent measures were determined for each day of assessment (10 trials/day) and then summed and analyzed over the four days of assessment. An arcsine transformation recommended for standard use with proportions was performed on each accuracy score prior to analysis (see Winer, 1971).

Appropriateness of Self-Regulation. Self-regulatory performances of the two training groups were compared at each day and over the total 4-day assessment period by t-tests. No significant differences in accuracy between the external training and internal training groups were found. It should be noted that both training groups self-regulated appropriately on approximately 70% of the trials through out the four days of assessment.

Task Performance. The following set of orthogonal planned comparisons were selected in order to evaluate each of the four remaining dependent variables:
(1) External and Internal standard training groups vs. External standard and No standard control groups.

(2) External standard training group vs. Internal standard training group.

(3) External standard control group vs. No standard control group.

(1) Training groups vs. Control groups: This primary planned comparison for total number of pieces completed, revealed that on Day 1, the external and internal standard training groups (M = 140.6, M = 130.0 respectively) completed a significantly greater (t = 3.3, $p < .01$) number of design pieces than the external standard (M = 80.4) and no standard control groups (M = 109.1). This comparison approached significance on Day 2 (t = 1.91, p = .068). On Day 3, the external

standard training group ($\underline{M}$ = 155.3) and internal standard training group ($\underline{M}$ = 149.4) again significantly outperformed ($\underline{t}$ = 3.484, $p < .005$) the external standard control group ($\underline{M}$ = 102.3) and the no standard control group ($\underline{M}$ = 121.0). On Day 4, the difference between the two training groups (external standard; $\underline{M}$ = 160.7, internal standard; $\underline{M}$ = 151.3) and the two control groups (external standard; $\underline{M}$ = 105.0, no standard; 127.4) was again significant ($\underline{t}$ = 3.686, $p < .005$). Finally when one looks at performances summed over the four days of assessment, the external training group ($\underline{M}$ = 601.0) and the internal standard training group ($\underline{M}$ = 571.0) put together a significantly greater ($\underline{t}$ = 3.315, $\underline{p} < .005$) number of design pieces than the external standard control group ($\underline{M}$ = 398.143) and the no standard control group ($\underline{M}$ = 480.14).

The same results were obtained when analyzing the second performance output measure; completed designs. This primary planned comparison revealed that on Day 1, the external standard training group ($\underline{M}$ = 22.0) and the internal standard training group ($\underline{M}$ = 21.7) completed a significantly greater ($\underline{t}$ = 2.41, $p < .05$) number of designs than the external standard control group ($\underline{M}$ = 12.57) and the no standard control group ($\underline{M}$ = 17.4). On Day 2, this comparison approached significance ($\underline{t}$ = 1.95, $\underline{p}$ = .063). On Day 3, the external standard training group ($\underline{M}$ = 25.4) and the internal standard training group ($\underline{M}$ = 26.0) and the no standard control group ($\underline{M}$ = 19.9) again significantly outperformed ($\underline{t}$ = 3.0, $\underline{p} < .01$) the external standard control group ($\underline{M}$ = 15.0). This primary planned comparison again approached significance on Day 4 ($\underline{t}$ = 1.92, $\underline{p}$ = .066). Finally when one looks at the training and control groups' performance summed over the four days of assessment, the external standard training group ($\underline{M}$ = 97.14) and the internal standard training group ($\underline{M}$ = 96.9) put together a significantly greater ($\underline{t}$ = 2.54, $\underline{p} < .02$) number of designs than the external standard control group ($\underline{M}$ = 63.4) and the no standard control group ($\underline{M}$ = 77.57). No significant differences for this comparison were found on the accuracy measures of proportion of design pieces completed correctly per day and proportion of designs completed correctly per day.

(2) External standard training group vs. Internal standard training group: No significant differences between the two training groups for each day of assessment and over all four days of assessment were found on any of the performance measures. These results indicate that the students who self-regulated and set their own standards (e.g., internal standard training group) performed as well (e.g., put together as many designs and design pieces) and as accurately (e.g., put together as many correct designs and design pieces) as the students who self-regulated and had their standards set externally (e.g., external standard training group).

(3) External standard control group vs. No standard control group: No significant differences between the two control groups for each day of assessment and over the four day assessment period were found. These results indicate that there were no differences in a group of students who had appropriate standards set externally and a group that did not.

Discussion

In this follow-up study we taught our students to regulate their performances on an additional task, design matching. In addition, we modified our training by not requiring students to perform on the task when learning the various component self-regulatory skills. Instead, we presented them with predetermined numbers of

designs completed and had them self-regulate based on these. This approach not only reduced the amount of time necessary for training to be accomplished but was also effective. Again, all training students did reach criterion.

An additional component skill was developed in this study, standard setting. Since the setting of appropriate standards appears to be most important we trained one group of students to set standards based on their immediate past performance (i.e., what they did on the preceding trial). The students acquired this concept (i.e., set standard at last score) as evidenced by the standard setting behavior during the four performance assessment days.

When taught to set appropriate standards the internal training group performed the design matching task at a level equal to the external training group. In addition, all but one of the seven students in each training group self-regulated appropriately during the assessment period. These two self-regulating groups outperformed the control groups in terms of output (i.e., amount of work) but not accuracy (i.e., % correct). That is, while the training group put more designs together they were no more accurate in putting them together than the control group. All groups were about 80-90% accurate (# correct/#completed) on the design matching task. Of course, since the training groups put more designs together they also put more designs together correctly, but their accuracy did not improve with self-regulation.

Thus, our TMR students did learn to set appropriate standards on a design matching task. Groups of students who were exposed to a streamlined training program not only learned to engage in the self-regulatory component skills but also outperformed students who were not self-regulating.

Summary

Moderately retarded (TMR) students have been characterized as dependent and in need of constant supervision. The assumptions underlying this project are: (1) TMR students can not control their own behavior because they have not had the opportunity to learn the skills necessary to function independently, and (2) the specific skills required to regulate one's own performance can be acquired as can any other skill.

The purpose of this project was to develop and evaluate a self-regulation training program. Our first task was one of identifying what it was we wanted to teach our TMR students. Based on various theoretical viewpoints and empirical studies conducted with nonretarded populations we made two distinctions. Two possible effects of independent functioning, behavior maintenance and self-change, were identified as were two techniques, behavioral programming and environmental planning, that can be used to accomplish these effects or ends. While we would hope to eventually see TMR students effectively modifying their own response patterns (i.e., self-change), we decided that as a first step we should focus on developing skills that would allow them to maintain their own adaptive responses with a minimum of external control. The specific technique we hoped to teach our students was behavioral programming, specifically self-reinforcement. Once we identified this technique we delineated specific component skills that we believed were required for its effective application; self-monitoring, standard setting, self-evaluation, self-reward, and the ability to delay gratification.

In the development phase of this project we conducted six studies in which we attempted to determine (1) whether TMR students could perform these requisite skills, (2) if we could develop these skills in students who did not possess them, and (3) the effects of these acquired skills on task performance.

The results of these studies can be summarized as follows:

1. TMR students were not able to appropriately monitor, evaluate, reward, or set standards for their own performance when they were provided with detailed verbal instructions and several practice trials or appropriate demonstrations. We did find that even with our stringent delay of gratification assessment, many students (40%) were able to withstand a delay interval.

2. Our students could acquire self-monitoring, -evaluation, -reward, and standard setting skills if provided with a brief (approximately 1 hour) training program. This training included stepwise development of skills via taped and live demonstrations, prompting, and contingent feedback. We could not develop the ability to delay gratification in those students who initially evidenced an inability to do so.

3. We found at our retention assessment that students who learned to self-evaluate and -reward their performances on a block design task significantly outperformed students who had not acquired these skills. In a study examining the effects of the self-evaluation component alone we found that student

performances were not affected by the self-evaluative statements that they emitted. Finally, the performances of students on a bead stringing task were found to vary as a function of the cue for engaging in a self-monitoring response. That is, students who recorded when they finished a task significantly outperformed those who recorded when they did not finish a task.

These results suggest that TMR students, in general, can not engage in appropriate self-regulatory component skills when provided with minimal instruction. But, these skills can be acquired, generalized, and retained by most moderately retarded students if they are provided with a brief training experience.

In addition, it appears that the acquisition of these skills can affect task performance. Specifically, self-reward skills seem to be instrumental in affecting task performance as does the type of response or response consequence monitored by TMR students. Our results indicate that TMR students' self-evaluative statements do not function as conditioned reinforcers. We are not implying that TMR students can't effectively utilize self-evaluative statements but rather that without some prior intervention these verbal statements will not serve a reinforcing function.

Finally, the results of our attempts to first identify students who could not delay reward attainment and then to train this skill suggest that students who do not evidence this ability require prior training in task appropriate behavior (i.e., sitting and attending to a task for a minimum of 15 minutes). While some students appear to require this initial training, the majority appear capable of delaying reward attainment.

In the second phase of this project we developed and evaluated a Self-Regulation Training Program. The program was based on what we learned (i.e., specific results and general experiences) from the preliminary studies.

While the program centered on developing self-regulatory skills that could be applied in a given situation to a specific task there were a number of general features that would be applicable for almost any task in a structured situation (e.g., classroom). These features included; (a) specification of necessary entering behaviors (e.g., ability to attend to a task or a taped demonstration for a minimum of 15 minutes, ability to discriminate between various colors, numbers and work that was finished or not finished), (b) analysis of the required skills as they apply to the task and a breakdown of specific training steps, (c) criterion-based training procedures to insure that each student could perform the required behaviors at a given training step before progressing to the next step, and (d) utilization of taped demonstrations that allowed groups of students to be trained at the same time. In addition, we designed a self-regulation apparatus that could be adapted for use with a number of tasks.

The apparatus allowed us to observe each self-regulatory component skill directly. For example, marbles were placed in a plastic tube for the monitoring response, a red or green light was turned on to indicate the students' evaluation of their performance relative to a standard that was provided by placing an arrow at a particular point on the plastic tube, and finally a reward button was pushed in order to administer a token reward.

This apparatus and general training features were adapted for training students to self-regulate on a bead stringing task. Students were presented with 5 trays of beads to be strung. Each tray contained 5 beads. After stringing as many beads as they could in 125 seconds students were to record the number of trays they finished, evaluate their bead stringing performance as compared to a standard, and then conditionally reward themselves.

In order to evaluate the effects of our self-regulation training program two groups of students were trained in the component self-regulatory skills of self-monitoring, self-evaluation, and self-reward. During assessments of the effects of this training one group had appropriate external standards set for its performance while the other group was allowed to set its own standards. Two additional groups served as controls. Both had appropriate external standards set for them during assessments of their performance. In addition, one group was trained to engage in the self-monitoring component skill.

Following training in the self-regulatory skills or yoked experience all students were given an opportunity to work on the bead stringing task and on two transfer tasks. Additionally, measures of each student's self-concept were obtained from parents, teachers, and the student. Thus the training program could be evaluated in terms of its effect on (1) the acquisition and transfer of self-regulatory skills, (2) task performance, and (3) general self-concept.

The results can be summarized as follows:

1. All students who were exposed to the criterion-based training program did reach criterion at the last training step. The taped demonstrations were responsible, in part, for the successful training. Students who were exposed to the training program were more likely to regulate their own behavior when working on the training task than students who served as controls. More importantly, training students continued to regulate their performacnes on a transfer task when given specific instructions to do so. And, most importantly, when presented with an additional transfer task they appropriately regulated their performances even though no specific instructions to do so were provided.

2. Students who were trained to self-regulate worked at a higher rate on the training task and on the second transfer task than students who had not been exposed to the training program. Within the training groups we found that students who were allowed to set their own standards for performance and who did so appropriately on the first transfer task outperformed those who set inappropriate standards. In addition, those who self-regulated appropriately while working on the second transfer task outperformed those who did not appropriately self-regulate.

3. We did not find any differenences in self-concept between the trained and control groups

The results indicate that our training program was effective in eveloping

self-regulatory (i.e., self-reinforcement) skills in a population of TMR students. These skills were not only acquired but also generalized to two different tasks.

Superior task performances by the trained groups relative to the control groups indicate that the self-regulatory component skills of self-evaluation and self-reward are most effective in maintaining behavior at a high rate. These component skills appear to be responsible for the effects obtained as all groups had standards set for their performance (students in the internal training group set their own) and one of the control groups also learned to self-monitor. Further evidence for the beneficial effects of these component skills comes from looking at the task performances of trained students who did and did not appropriately self-regulate on the second transfer task. That is, trained students who self-regulated outperformed trained students who did not appropriately self-regulate on this transfer task.

In addition, the appropriateness of the standards that were self-set appears to be most important in determining whether students will be able to maintain their own behavior. A follow-up study was conducted in order to determine if we could develop these important standard setting skills along with the other self-regulatory skills. We also hoped to be able to determine the effects of external standards on performance.

Two groups of students were trained to self-monitor, self-evaluate, and self-reward their performances on a design matching task. One group was also taught to set appropriate standards (i.e., based on immediate past performances). The other group had appropriate external standards set. One control group also had appropriate external standards set while the other control group did not. Following training all students had an opportunity to work on the design matching task over a 4-day period. The effects of this training were evaluated in terms of (1) the appropriateness of trained students' self-regulatory responses and (2) the effects of the various training and/or standards on task performance.

The results can be summarized as follows:

1. All students exposed to the training program reached criterion at the final step. Six of seven students in each training group appropriately self-regulated during the four assessment days.

2. The training groups significantly outperformed the control groups on the design matching task (e.g., numbers of pieces and designs completed in 2 minutes). The task performance of the group trained to set its own standards was equivalent to the trained group that had appropriate external standards set for it. Similarly, there were no differences in task performance between the two control groups (i.e., external standard only vs. control).

It appears, based on the results of this study, that TMR students can learn to set appropriate standards for their performance, and if they do, they perform at a level equal to students who self-regulate and have external standards set for them. At the same time, it does not appear that standards for performance by themselves have any affect on task performance. Rather,

the appropriateness of standards for performance appear to be most important in determining task performance when students have learned to self-monitor, self-evaluate, and self-reward.

In sum, we found that our TMR students could learn to program their own performances on a number of tasks that might be presented in a classroom setting. Acquisition and the application of skills necessary to engage in self-reinforcement resulted in effective behavior maintenance by these students. That is, TMR students were able to develop self-regulatory skills, apply them appropriately, and effectively regulate their own performances.

Suggestions for the classroom and home

The results of this project indicate that TMR students can be given more responsibility for managing their own behavior both in the classroom and at home. At a minimum, moderately retarded children can be expected to learn how to monitor their own behavior. This not only frees parents and teachers from having to externally monitor a child but can also lead to changes in the behaviors being self-monitored. We would suggest that the outcomes or behaviors that a child monitors should be positive in order to take advantage of the reactive effects of self-monitoring. For example, after hearing us present the results of this project at a parent meeting a parent asked how she might utilize this information in trying to eliminate her child's bed wetting at night. She had, for the past couple of weeks, been using a chart on which she placed stars or Xs depending on whether her boy was dry or wet, respectively, the preceding night. Based on our findings I suggested that she have her son do the recording and that he only record (i.e., put a star on the chart) when he was successful (i.e., dry).

In addition to allowing TMR children to monitor their own behavior, we would suggest that teachers and parents look for situations when it would be appropriate to give a retarded child more responsibility for setting standards, evaluating and rewarding his/her performance. If care-takers (e.g., parents and teachers) spend a little more time initially developing these skills in retarded children, they and the child can benefit in the long run. That is, the children will learn to be more dependent on themselves and care-takers will spend less time having to supervise their kids.

Recommendations

This project and its results represent a first step in our attempt to develop self-regulatory skills in TMR students. While our findings leave us quite optimistic we realize that much work needs to be done before we can claim that moderately retarded children can regulate their own behaviors.

Specifically, we need to:

1. Evaluate the effectiveness of our training as we move from the lab to class settings. We must also determine if we can adapt our training procedures and apparatus to tasks that TMR students are typically assigned in the classroom. To accomplish this teachers must be involved in identifying activities, adapting procedures, and implementing the training.

2. Try to develop other self-regulatory skills in TMR students

(e.g., environmental planning). There is some indication that educable mentally retarded (EMR) students can learn to effectively utilize this technique to modify their conceptual style and resultant task performance (see Guralnick, 1976). While TMR students may be less likely to be able to develop self-instructional verbal statements as did the EMR students, there is every reason to believe that they can learn how to arrange their environment so that responses are more or less likely to occur (i.e., plan their environment).

3. Consider trying to teach TMR students to change their own behavior. That is, we might try to develop problem solving skills (e.g., identification of behaviors to be changed, plans for change, commitment to change, and implementation) in TMR students (see Karoly, 1977 for a model of self-change).

4. Allow moderately retarded children to regulate their own behavior for a longer period of time before we can expect to see changes in self-concept and/or locus of control orientation. In addition, a recent report (Hoffman & Weiner, 1978) suggests that causal attributions can be manipulated in a retarded population and that subsequent performances are a function not only of prior success or failure but also of causal ascriptions for these outcomes. We tried to assess causal attributions via verbal reports in our TMR population and were not successful. Based on Hoffman and Weiner's study it appears that internal attributions can be communicated via feedback provided by an external agent. The challenge for the future would be to try to transfer control of this feedback from the external agent to the individual. Once this is accomplished changes in self-concept are more likely to follow.

5. Develop a self-regulation curriculum that includes; specification of the various skills to be developed, necessary entering behaviors, and procedures for training skills that can be applied in a variety of settings with a variety of tasks.

Finally, we would recommend that other populations (e.g., more severely handicapped, younger handicapped, autistic, etc.) be exposed to the training program to determine if they too can benefit from such training.

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